AMC

NMC

# JOINT PROGRAM STUDY

# FINAL REPORT

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## APPENDICES

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Prepared by:

Joint Service Acquisition Program Management Study
Ad Hoc Group

AFLC

AFSC

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# PROGRAM DESCRIPTIONS

# AIM-7M

DESCRIPTION:

The AIM-7M Sparrow is the latest in a family of semi-active, radar-guided, air-to-air missiles. This weapon is currently employed on the F-4, F-14, F-15, and F-18 aircraft. Another version of the missile, the RIM-7M, is used for ship-board defense as a surface-to-air missile in the Seasparrow System. Both Raytheon and General Dynamics produce the missile.

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

The original Sparrow was developed by the Navy. The Air Force became involved when they purchased the F-4 aircraft which used the AIM-7 as a primary weapon. A joint F-4 program office was subsequently established and was responsible for procuring the AIM-7s for both Services. When the F-4 went out of production in 1972, a joint AIM-7 program was formed with the Navy assigned as lead Service because of an on-going technical ability. The AIM-7F was the first jointly-developed version. The Air Force wanted a Pulse Doppler (PD) version for the F-15 and the Navy wanted a multitarget/multishot capability. The AIM-7F became both Pulse Doppler and Continuous Wave (CW) (Navy), but did not have multitarget/multishot capability. The next upgrade was the AIM-7M and was fully managed as a joint program with only minor compromises. Current issues revolve around the Air Force phasing out the AIM-7 in favor of AMRAAM. The Air Force has deleted AIM-7 procurement after FY84 and the impact of this is a $155 million cost increase to the Navy for FY85 and FY86.

Program #2

AIM-9M

DESCRIPTION:

The AIM-9 Sidewinder is a supersonic, air-to-air, infrared homing missile. The Sidewinder first went into service in 1956 and currently, three versions (AIM-9H, -9L, and -9M) are in operational use on a variety of platforms. The weapon is produced by Ford Aerospace and Raytheon.

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

The Navy began development of the AIM-9 in 1948. There has been joint procurement of this missile since the "B" model in the early 1950s. Each Service has had a different version of this missile; the Navy had a gas-cooled missile while the Air Force had a thermoelectric-cooled version. The missiles were not interoperable and were procured and managed by different program offices. During the late 1960s, each Service was developing an improved "dogfight" missile. Then in 1970, OSD directed the Services to use an upgraded version of the AIM-9 which was to be developed by the Navy. A joint program was established in 1971. The jointly developed missile encompassed both gas and thermoelectric cooling and was procured for both Services. Like the AIM-7 program, the Air Force is phasing out the AIM-9 with the last Air Force production in FY84. Some consideration was given to the Army using AIM-9 for SAM, but the Army was able to argue for the CHAPPAREL.

# AIR-LAUNCHED CRUISE MISSILE (ALCM)

DESCRIPTION:

The Air Force's Air-Launched Cruise Missile (AGM86-B) is a subsonic, winged, turbofan engine-powered, air-to-surface missile designed to deliver a nuclear warhead. B-52G/H and B-1B aircraft will be capable of ALCM carriage and launch when equipped with either an internal launcher or external pylons. ALCM navigation to the target is achieved by means of an inertial navigation system with periodic position update in free flight utilizing terrain contour matching. The ALCM is 20 feet 9 inches long and has a deployed wingspan of 12 feet. It weighs about 3000 pounds and has a range of approximately 1500 nautical miles.

Initial Operational Capability (IOC) was achieved on schedule in December 1982 at Griffiss AFB, NY (16B-52G/192 ALCM). Congressonal action in late December 1982 reduced the ALCM missile buy in FY83 to 330 missiles, following an early December 1982 OSD decision to terminate ALCM procurement in FY83 in favor of Advanced Cruise Missile procurement.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The ALCM, the land attack Sea-Launched Cruise Missile (SLCM), and the Ground-Launched Cruise Missile (GLCM) programs are structured to have maximum commonality in engine and navigation/guidance subsystems. The ALCM and SLCM share the common W-80 nuclear warhead under development by the Department of Energy. The SLCM and GLCM, the engine, navigation/guidance and mission planning projects are jointly managed through the Joint Cruise Missile Program Office (JCMPO) (Naval Material Command), Washington, D.C. However, after the April 1980 production decision, management of the ALCM was transferred to the Air Force Strategic Systems Program Office (SSPO), Wright-Patterson AFB, Ohio. The B-52 Squadrons, Program Element (PE) 11113F, is also related to the ALCM. The B-52 Cruise Missile Carriage, Offensive Avionics System, and other projects require close coordination with the ALCM program to ensure full compatibility. A memorandum of understanding exists between Air Force Systems Command and the JCMPO which delineates interface tasks.

# AMRAAM

DESCRIPTION:

The Advanced Medium Range Air-to-Air Missile (AMRAAM) is a joint Air Force/Navy development program for replacement of the Sparrow air-to-air missile. AMRAAM will be an all-weather, all-aspect missile that will work within and beyond visual ranges. It is designed to meet the projected threat in the 1985 to 2005 timeframe. The AMRAAM will feature solid state electronics and an active-radar guided capability allowing for "launch and leave." It will also have increased velocity and a larger performance envelope than the Sparrow, plus allow for simultaneous, multiple targeting. The missile will be compatible with the F-14, F-15, F-16, and F-18 aircraft. In fact, without AMRAAM, the F-16 lacks all-weather capability. Weighing approximately 300 pounds, measuring less than 12 feet in length and less than 8 inches in diameter, the AMRAAM is smaller and lighter than the Sparrow. With a range of between 30 to 40 nm, it has a longer standoff distance than the Sparrow. The guidance system incorporates an inertial midcourse and active RF terminal.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The Air Force has the overall management responsibility of the joint program office (JPO) located at Eglin AFB, Florida, with the Navy having only 11 people in the JPO. The program is currently in full-scale development, but has been joint since the concept evaluation phase. As presently envisioned, the total Air Force/Navy requirements are estimated at approximately 20,000 missiles (Air Force -- 65 percent, Navy -- 35 percent) with maximum production of 3000 per year.

Program #5

AN-AVS6

DESCRIPTION:

The AN-AVS6 is a night vision goggle designed for use by aircraft crew members. It is an integral part of the aircrew members' flight helmet, and operates on the principal of detecting light and heat given off by targets in the infrared spectrum. The goggles are currently planned for use only in rotary wing aircraft, but some work is being done to adapt them for use in high-speed, fixed-wing aircraft.

LEAD SERVICE: Army

PARTICIPATING: Marine Corps, Air Force

JOINT DETAILS:

The Army developed the AVS6 essentially as a single-Service product based on a need generated by the Army Aviation School. Both participating Services saw the utility of the product and voluntarily joined in the procurement. R&D was funded essentially by Army, but each Service will fund its own production. There is some Air Force-funded R&D work being done on the application in high-speed, fixed-wing aircraft.

Program #6

ANTSC 94A/100A

DESCRIPTION:

The ANTSC 94A is a Mobile, Ground Satellite Terminal which gives Air Force ground units the capability to use the satellite communication system. The system is shelter-mounted and can be operated from the back of a truck or on the ground.

LEAD SERVICE: Army PARTICIPATING: Air Force

JOINT DETAILS:

This is a unique kind of joint program in that the Army is developing equipment to meet a unique Air Force requirement. The equipment will not be used by the Army, but in their role as developer of ground terminals for satellite communications, they were given the mission. Although the Army is managing the production and doing the procurement, the Air Force is paying the entire production bill.

# AN/APG-68 RADAR

DESCRIPTION:

The AN/APG-68 Fire Control Radar for the F-16 C/D aircraft is a coherent, multimode, digital fire control sensor designed to provide all weather air-to-air and air-to-surface modes with superior dogfight and weapon delivery capabilities. The AN/APG-68 is an improved version of the AN/APG-66 currently in the F-16 A/B aircraft and the Army's Sergeant York Air Defense Gun (DIVAD). The AN/APG-68 is designated the AN/APQ-164 for the B-1B bomber.

LEAD SERVICE: None PARTICIPATING: Air Force, Army

JOINT DETAILS:

Each radar program is managed by its vehicle program office. The three program offices have MOUs between them. The MOUs define responsibilities for configuration control, Service reports, material improvement program, status accounting, program and technical reviews. The government did not direct this as a joint program. The radar contractor, Westinghouse, was able to use his existing production experience, and enlarged production base to reduce costs and win the B-1B and DIVAD radar competitions. Therefore, the contractor made the program joint to achieve cost benefits.

Program #8

## ADVANCED STRATEGIC MISSILE SYSTEM (ASMS)

DESCRIPTION:

The Advanced Strategic Missile System (ASMS) is the single Air Force program for the development of advanced ballistic missile technology. This program is responsible for developing missile subsystems such as propulsion, G&C, reentry, penetration aids, and basing systems. It includes the Reentry Systems Launch Program, a tri-Service, cost reimbursable, launch program using surplus Minuteman I boosters to launch reentry experiments for the Services.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The ASMS program includes advanced development previously pursued in the Advanced Ballistic Reentry Systems (ABRES) program (PE 63311F) and the Advanced Intercontinental Ballistic Missile Technology program (PE 63305F). The program is coordinated with the Army's Systems Technology Program and Ballistic Missile Defense Advanced Technology Center; the Navy's Strategic Systems Program Office; the Defense Advanced Research Projects Agency; the Defense Nuclear Agency; the Department of Energy, Military Applications; Government laboratories and testing facilities and other agencies dealing with ballistic missiles and associated basing. Efforts are coordinated with the Minuteman program (PE 11213F) and the Peacekeeper program (PE 64312F) for development of advanced reentry vehicles; penetration aids systems; advanced missile guidance; evaluation of deceptive, defended, closely spaced and mobile basing; and demonstration launches. Tri-Service and intra-Air Force coordination is accomplished through annual program reviews and working level exchanges. Effective coordination and avoidance of duplication with the Minuteman and Peacekeeper programs is achieved through joint management and collocated program offices within the Ballistic Missile Office.

# AIRBORNE SELF PROTECTION JAMMER (ASPJ)

DESCRIPTION:

The Airborne Self Protection Jammer (ASPJ), designated as the ALQ-165, is a joint Air Force/Navy engineering development program for an internally mounted electronic countermeasures (ECM) system that will provide self protection and increase the probability of aircraft survivability when various tactical aircraft (F-16, F-14, F/A-18, A-6E, and EA-6B) are confronted by modern diversified radar controlled weapon systems. Development of associated support equipment, alternate technology, and aircraft integration are included. Also included is development of a Comprehensive Power Management System (CPMS) for the USAF ALQ-131 ECM Pod to be carried by those aircraft not programmed for ASPJ. Major component, subsystem, and system development will continue through the full scale production decision. Engineering Development Model systems will undergo effectiveness, qualification, and reliability testing. These systems will also be used to prototype aircraft installations.

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

ASPJ development is managed by a joint Navy/Air Force Program Office at the Naval Air Systems Command, Washington, D.C. The Navy is the lead Service. The Air Force unique portion of this program, integration of CPMS into the ALQ-131 and ASPJ into the F-16, is managed by the Aeronautical Systems Division, Wright-Patterson AFB, Ohio with assistance by AFLC, Wright-Patterson AFB, Ohio.

Navy funds are provided under PE 64226N, Advanced Self Protection Systems. It is the intent of this program to attain 100 percent commonality of the ASPJ system design for internal application and to equally share the total Group B cost of engineering development between the two Services. The Air Force and Navy joint development efforts were initiated during FY79. Air Force funds were provided under PE 64738F, Protective Systems, and PE 64739F, Tactical Protective Systems. In FY80, Air Force direction and funds for this effort were consolidated under PE 64737F, Airborne Self Protection Jammer. The F-16 internal ECM (IECM) efforts are directly related to PE 27133F, F-16 Squadrons. The ALR-74 Radar Warning Receiver program is beng interfaced with the ALQ-165 to ensure compatibility.

## ANTI-TACTICAL MISSILE

DESCRIPTION:

The Joint Antitactical Missile program has been established to develop a defense against the threat of tactical missiles. The program will be executed in two concurrent phases directed toward near and long term solutions. The near term program is an accelerated evaluation of current and emerging DoD air defense systems. Product improvements of these systems provide the fastest means to counter a portion of the threat (including cruise). The long-term approach will be a complete joint systems approach to define the overall concept. It will include early warning, tracking and targeting of ballistic missiles, satellite surveillance, airborne radars, and communication and intelligence systems needed to guide offensive missiles against the threat.

LEAD SERVICE: Army PARTICIPATING: N/A

JOINT DETAILS:

To date, only the lead Service has expended any real effort toward this program. The Army has established a PMO at Redstone Arsenal, Alabama, and is working on the near term solution. Current plans for a Joint Service Operating Requirement (JSOR) for the long term solution call for it by September 1984. The program is in very early stages of Concept Exploration.

A-7

DESCRIPTION:

The A-7 is a single place, single engine, light-attack aircraft. The primary mission is air-to-ground delivery of various types of conventional ordnance. The A-7 is capable of carrying approximately 15,000 pounds or external wing stations and is also armed with a 20mm cannon and Sidewinder missile stations.

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

The Navy began development of the A-7 in 1963 as a low-cost, light-attack aircraft based on the F-8 aircraft. The Air Force was encouraged to select the A-7 for its close air support role. The Air Force version of the A-7 contained a number of modifications including improved avionics, improved gun, and a different engine. The resulting Air Force and Navy configurations had considerably less commonality than initial expectations predicted.

# BIGEYE

DESCRIPTION:

BIGEYE is a binary chemical bomb that will be delivered from conventional tactical aircraft to dispense a toxic nerve gas. The key difference between BIGEYE and existing chemical weapons is that it is a binary chemical weapon. This means it is composed of two non-toxic chemicals that are mixed to form a toxic agent. BIGEYE is safer for storage and employment than current chemical weapons because the actual mixing of the chemicals does not occur until after the weapon is released from the aircraft.

LEAD SERVICE: Navy PARTICIPATING: Air Force, Army

JOINT DETAILS:

The Navy began development of BIGEYE in 1963. In 1969 when it was ready for test, a Presidential order halted all work on chemical weapons. In 1974, OSD directed the Services to come up with a joint development plan to renew development of binary weapons. Based on prior efforts, the Navy was designated lead Service and paid for all development costs except Air Force-unique items. The Army will pay facilitation costs for the production phase. Each Service has a separate program office; the program manager is located in Washington, D.C. and is double-hatted as a NAVAIR division director. Other Navy personnel are located at China Lake and Dalgren; Air Force personnel are located at Eglin AFB, Florida, and Army personnel are located at Aberdeen Proving Ground, Maryland, Pine Bluff, Arkansas, and Dugway Proving Ground, Utah.

# DOD BASE AND INSTALLATION SECURITY SYSTEMS (BISS)

DESCRIPTION:

The BISS program is an evolutionary RDT&E program which will provide a DoD standard electronic exterior physical security system for protecting DoD resources worldwide. This system's components include sensor, imaging, entry control, and command and control equipments. The system concept emphasizes maximum commonality of major items and a variety of supporting subsystems. It offers a flexible choice of equipment (Air Force developed/commercially available) which must be tailored to the unique physical characteristics of the location and to the threats involved.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

JOINT DETAILS:

The program was directed by OSD in 1972 and evolved into an Air Force managed, confederated program with most of the R&D activity performed at government laboratories. While there was some R&D activity prior to 1976, the Air Force was given overall management responsibility in 1976. ESD at Hanscom AFB is the Executive Agent while Eglin AFB, Fort Belvoir, Naval Underwater Systems Center (NUSC), Griffis AFB, and Fort Monmouth provide technical support by assuming full responsibility for developing a specific piece of equipment.

- Army -- develop Interior Sensors
- Air Force -- develop Exterior Sensors
- Navy -- develop Water-borne Sensors.

The Directive also established an OSD Committee (Physical Security Action Group (PSAF)) that provides general management, technical direction, and problem resolution. In this scheme, no formal JPO exists, but each Service has liaison personnel at major cites, i.e., Army representatives at Hanscom and Air Force representatives at Fort Belvoir. The program is currently in an advanced production/procurement acquisition phase.

# COMBAT FIELD FEEDING SYSTEM (CFFS)

DESCRIPTION:

The Combat Field Feeding System is a modular food service system designed to provide hot meals to troops in a fluid combat situation. The mainstay of the system is the "T-ration," prepared foods in flat cans one half the size of a normal steam table serving tray. "T-ration" items include entrees, vegetables, and desserts which can be heated and served to combat soldiers in all but the most intense combat situations. The rations are equal to or better than B-ration quality and require less time and fewer cooks to prepare and serve a meal to a company size unit. The equipment of the CFFS consists of a Mobile Food Service Unit and a Supplemental Field Kitchen Kit. The Mobile Food Service Unit can heat T-rations while on the move and the Supplemental Kit contains equipment required to prepare A-rations as available.

LEAD SERVICE: Army

PARTICIPATING: Marine Corps, Air Force

JOINT DETAILS:

Although the CFFS is specifically an Army requirement, all food service equipment is developed under direction of the Joint DoD Food RDT&E Program. The Marines are testing the system and show great interest in the program. The Air Force is committed to using many elements of the system in a food service system for GLCM crews.

Program #15

## CHEMICAL DEFENSE MASK (MCU-Z/P)

DESCRIPTION:

The MCU-Z/P Chemical Defense (CD) Mask is a full-face respirator with an interior nosecup. The flexible lens is bonded to the silicone facepiece assembly. The mask uses a Canadian C-2 canister, with NATO screw thread for filtration of chemical warfare agents. A separate mask carrier and attachable hood are provided with the mask. The mask will replace the current M-17A1 mask.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The Army Chemical Systems Laboratory (CSL) developed and managed the XM-30 Mask Program (AF designation-MCU-Z/P) until the Department of the Army terminated Army involvement in December 1982. The Air Force took over as lead Service to manage procurement of the MCU-Z/P. The Navy will buy a portion of the projected 340,000 production units from the Air Force.

Program #16

# COMPONENT IMPROVEMENT PROGRAM (CIP)

DESCRIPTION:

Aircraft engine component improvement programs (CIP) are initiated after an engine/component has successfully completed all of the required development tests, meets the specification in the development contract, and the first production funded aircraft using the engine/component is accepted by the military. Historically, systems add offensive/defensive equipment, have mission and/or tactics changes, and operate in different environments to meet the ever-changing threats. It has been demonstrated that an active engine component improvement program is an effective means of reducing the cost of engine ownership, and improving system operational readiness through improvements in durability, maintainability, operability, reliability, repairability, and suitability of the engine as operational conditions change and service time is accumulated. System changes continue throughout the operational life of a system; therefore, the engine component improvement program provides the engineering support required to obtain engine changes which are essential for satisfactory system performance in operational use at a cost affordable to the Services.

LEAD SERVICE: Varies with Engine

PARTICIPATING: Varies with Engine

JOINT DETAILS:

The Engine Tri-Service Coordination Group provides coordination, reduces duplication, and resolves differences for those engines procured by two or more Services. An example of a joint engine is the TF 30 for the Air Force F-111, Navy F-14, and Navy/Air Force A-7. Each Service provides funding for each engine based upon its ratio of engines to all engines (other Service(s) and FMS) and any Service-unique requirements.

# CNCE (TRI-TAC)

DESCRIPTION:

The CNCE program (part of TRI-TAC) is being developed so the Services can acquire secure switched digital communications equipment for use in a tactical environment. This includes trunking and switching equipment, system control facilities, local distribution equipment, terminal devices, and interface equipment. The effort seeks to achieve economy through joint participation and centralized acquisition of tactical equipment. In the Air Force, TRI-TAC equipment will replace existing mobile equipment in the combat communications groups and tactical air control system units. TRI-TAC equipment will provide a digital capability to allow total system security, and increased capacity to support the data and voice, point-to-point switching and transmission needs of deployed Tactical Air Forces worldwide.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

JOINT DETAILS:

The OSD TRI-TAC office assigned the Air Force the responsibility of developing the CNCE for TRI-TAC. The Air Force was to pay all development costs, but a joint specification was negotiated and agreed to by both Services. As development commenced, the Army increased its requirements, but they could not be met in the FSD baseline system. Design of an Army variant began but was never finished. Testing of the FSD article was completed in 1981. The Air Force wishes to go into production with the existing system and the Army wants to develop their own system. OSD has directed the Air Force to procure the CNCE and the Army to provide partial funding now to be repaid later by the Air Force.

Program #18

# COBRA JUDY

DESCRIPTION:

The COBRA JUDY system includes the functional elements of phased array radar; data processing hardware, software, and peripherals; timing; telemetry; navigation; communications; operations control center, modified shop platform, and support subsystems.

LEAD SERVICE: Air Force PARTICIPATING: Army

JOINT DETAILS:

The Electronic Systems Division of the Air Force Systems Command has been designated as the procuring agency for the system and is responsible for system acquisition management.

The COBRA JUDY Systems Program Office within the Deputy for Surveillance and Navigation Systems has been assigned the overall responsibility for system acquisition, including coordination of the efforts of the participating agencies to achieve the program objective.

The Military Sealift Command participated in preparation of the requests for proposal and evaluation of responses thereto, exercised design review and approval authority in all matters affecting ship conversion and overhaul and provided construction representation during the conversion and overhaul period.

Detachment 1, Space and Missile Test Center (DET 1 SAMTEC) has been designated to provide engineering support for GFE range instrumentation subsystems during acquisition and assumed command management logistics support for the system after its acceptance by the U.S. Government. DET 1 SAMTEC is responsible for the management and operation of the COBRA JUDY System.

Foreign Technology Division (FTD AFSC)) and Ballistic Missile Defense Advanced Technology Center (BMDATC (U.S. Army)), as COBRA JUDY System users, will establish overall system requirements and concepts of operation.

Program #19

# COMBAT ID

DESCRIPTION:

Combat ID provides an improved identification capability that is needed for employment of air defense weapons, air defense surveillance and control radars, air-to-surface weapons, and surface-to-surface weapon control systems. Land, sea, and air offensive systems which fire upon the enemy, and those systems which identify, coordinate, allocate resources, and direct firings must be capable of positively identifying targets beyond the maximum lethal range of the weapon.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

JOINT DETAILS:

Combat Identification Systems is a basket of several individual Army, Navy, and Air Force programs/projects imbedded within 7 program elements (2 Air Force, 2 Army, 3 Navy). The Mark XV Identification Friend or Foe (IFF) system is the only truly joint program currently included in the CIS complement of programs. The CISPO is located at ASD, Wright Patterson AFB, Ohio, with 23 Air Force, 2 Army, and 1 Navy personnel assigned. The program is presently in the demonstration and validation phase.

# COPPERHEAD

DESCRIPTION:

Copperhead is a 155mm cannon-launched, terminally guided projectile. It consists of a semi-active laser seeker and gravity biased proportional navigation guidance system, shaped charge warhead, and a control section. A round is fired like any other artillery round (except that a laser code and arming time must be set) and is guided to its target by ground, heliborne, or remotely piloted vehicle laser designators. These remote designators bathe the target with a laser beam in the final seconds of the projectile's flight and the seeker homes in on the target.

LEAD SERVICE: Army PARTICIPATING: Marine, Navy

JOINT DETAILS:

The Copperhead projectile has been essentially a single Service development by the Army with a Marine Corps "buy-in." The laser designator is, however, a joint development by the Army and Marine Corps. In fact, one version of the laser designator is being driven by Marine Corps requirements. During 1983, Congress directed the Navy to merge their five-inch terminally guided projectile with the Army program. The physical size of the two rounds precludes much commonality, but there will be extensive use of the Copperhead technology in the Navy munition.

# DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP)

## DESCRIPTION:

DMSP's mission is to provide global meteorological satellite data to support worldwide DoD operations. It provides timely, global, visual, and infrared cloud cover and other specialized meteorological data to the Air Force Global Weather Central and the Fleet Numerical Oceanography Center. The Block 5 operational satellite system consists of a minimum of two operational satellites in sun synchronous polar orbits and the associated communications, ground receiving and processing equipment necessary to deliver data to the military weather services. Cloud imagery is the primary defense need while vertical temperature soundings are the primary commerce need.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

## JOINT DETAILS:

A Memorandum of Agreement on Joint Service Management and Operations dated 15 December 1976 established the joint-Service program. The Navy is equiping all large carriers to receive data and is operating two shore-based terminals to receive data. Air Force follow-on production procurement of 12 terminals will begin in FY84. The Marine Corps has procured 1 RDT&E model and began production procurement in FY82.

Program #22

DIGITAL RADIO AND MULTIPLEX ACQUISITION (DRAMA RADIO)

DESCRIPTION:

The DRAMA project provides for the acquisition of major wideband transmission equipment for the Defense Communication System Improvement Plan. Primarily it provides for a transition from analog to digital microwave radios and multiplexers. These are fixed station strategic communications facilities and the PM's responsibility does not include facilities construction.

LEAD SERVICE: Army PARTICIPATING: Air Force

JOINT DETAILS:

In this program, the Army was essentially the procuring agency for equipment to be used by both Services in the Defense Communications System. Requirements were driven by DCS and both Services were using exactly the same equipment.

# DEFENSE SATELLITE COMMUNICATIONS SYSTEM (DSCS) SATELLITES AND GROUND TERMINALS

DESCRIPTION:

The Defense Satellite Communications System (DSCS) provides super high frequency satellite communications for secure voice and high data rate transmissions. It satisfies the unique and vital national security communications requirements of worldwide military command and control, crisis management, relay of intelligence and early warning data, treaty monitoring and surveillance information, and diplomatic traffic. Specifically, the DSCS supports the National Command Authorities, the Worldwide Military Command and Control System, the Defense Communications System, the Diplomatic Telecommunications Service, the White House Communications Agency and mobile forces of all Services. The DSCS satellite constellation is required through the 1990s.

LEAD SERVICE: Air Force-Satellite
Army-Ground Terminals

PARTICIPATING: Air Force
Navy

JOINT DETAILS:

The Army budgets, develops, and procures ground terminals. The Navy performs these functions for shipborne terminals and the Air Force develops and integrates airborne terminals and develops launches and operates the DSCS satellites. The Air Force also provides launch services for the Titan III launch vehicle and has funding for ground equipment construction, operations and maintenance, and manpower to support its portion of the ground segment.

Program #25

## ENGINE MODEL DERIVATIVE PROGRAM (EMDP)

DESCRIPTION:

The Engine Model Derivative Program (EMDP) is aimed at filling a void which existed in the engine management and acquisition process for ten years. This program will conduct efforts to provide improvements in the specification characteristics (i.e., performance, durability/life, reliability/maintainability, and reduced risk of development) of in-service engines or those engines which have passed the equivalent of a military qualification test.

LEAD SERVICE: Varies with Engine

PARTICIPATING: Varies with Engine

JOINT DETAILS:

The EMDP program funds the pre-FSD activities required to upgrade an existing engine for a new mission or application. The lead and participating Services are determined by need and the Service's experience with a particular engine. The program can be single or multi-Service funded.

Program #26

FIREBOLT

DESCRIPTION:

The Firebolt is a high altitude, high speed, recoverable aerial target used to simulate threats in support of our weapon systems development programs and in the TAF Weapon System Evaluation Programs. It is launchable from F-4 and F-15 aircrafts.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The Air Force initiated the Firebolt program in 1970 with a single source study contract. The Navy came on board in December 1981 when the program was in full scale development; they picked up the option for 12 Firebolt vehicles and 36 refurbishment kits. The program office is at Armament Division, Eglin AFB, Florida. There are 16 Air Force and 1 Navy personnel assigned.

Program #27

# FLTSATCOM

DESCRIPTION:

FLTSATCOM (Fleet Satellite Communication) system is a world-wide UHF communication system. It provides protected fleet broadcast service to all Navy ships plus a command control service to all anti-submarine warfare platforms, fleet ballistic missile subs, aircraft carriers, cruisers and other platforms. The system also provides Air Force requirements for the Presidential airborne command post, SAC, and emergency mission support. Four satellites are in orbit and three more satellites are being procured to fill the gaps until MILSTAR is available.

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

FLTSATCOM is an OSD-directed joint effort. The Navy was the lead Service but the Air Force is the acquisition agent for the satellite. Air Force originally planned to use an Air Force launch vehicle, but the growth of the satellite resulted in an eventual use of the NASA vehicle. The Joint Program Office is located in Los Angeles with the Navy Space Program Office located in Washington, D.C. A major joint issue was merging the different Service requirements into one satellite package. The Navy has payed for all development costs.

# FMU-139

## DESCRIPTION:

The FMU-139/B Fuze is a solid state, electromechanical, multioption arming and functioning time, nose, or tail fuze used with Mk 80 series General Purpose Bombs (GPBs) both low and high drag configured, and the M117 bomb. The fuze is sized to slide with adequate clearance into the nose of the tail fuze well and profiled to conform with the end shape of the well to enhance impact survivability. The FMU-139/B Fuze is cylindrically shaped, 2.87 inches in diameter and 8.80 inches in length.

When installed in the nose and/or tail fuze well of a bomb, the fuze is completely enclosed within the bomb and locked in place with a closure ring. The fuze weighs approximately three pounds. The faceplate is a round steel disc that encloses the fuze and contains fuze setting knobs and a viewing port. The faceplate is an integral part of the fuze and is not removable. The opposite end of the fuze has a four-contact electrical connector. The FMU-139/B Fuze is designed for electrical initiation but does not contain any stored electrical power.

LEAD SERVICE: Navy PARTICIPATING: Air Force

## JOINT DETAILS:

The common (Joint Service) bomb fuze concept resulted from direction by the Under Secretary of Defense, Research and Engineering to consolidate Navy and Air Force fuze development efforts. The Navy was involved in the FMU-117/B Bomb Fuze Program and the Air Force in the FMU-112/B Bomb Fuze Program. The decision was made to redirect the FMU-117/B (Navy) program efforts into the development of a joint Service bomb fuze, while retaining the FMU-112/B (USAF) program to satisfy immediate requirements.

The Navy, designated as the lead Service for joint development of a low cost bomb fuze (later designated the FMU-139/B), established a program office within NAVAIRSYSCOM. A program manager (USN) and deputy program manager (USAF) have been assigned. The Naval Weapons Center, China Lake, CA, has technical management responsibility.

# F-100 ENGINE

DESCRIPTION:

The F-100/F-401 engine program is a joint development for the Air Force's F-15 and the Navy's F-14B.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

A joint Air Force/Navy Engine Program Office was established in 1968 for development of the F-100/F-401 engine. Development costs were shared equally with each Service funding its unique requirements. The Navy withdrew from the engine program following schedule slips in its F-14B. This caused the Air Force to rebaseline the program and absorb additional developmental costs.

# F-111

DESCRIPTION:

The F-111 is a multi-purpose fighter designed for short takeoff and landing in austere forward bases and all weather performance. The F-111's roles include air superiority, reconnaissance, close air support, and interdiction. The FB-111 model also performs as a strategic bomber. The F-111 is characterized by its variable swept wing, its supersonic capability at sea level, and its Mach 2.5 speed at 60,000 feet. The F-111 is powered by two Pratt and Whitney TF-30 afterburner turbofan engines. It features a self-supported, two seat crew module that allows crew ejection at any altitude and speed. The F-111 landing gear, specifically designed for the heavy stress of forward bases, utilizes a single main strut. This reduces gear retraction failures, eliminates bending load on shock struts, and minimizes the number of landing load points.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The Air Force initiated the program in February 1960. In November 1960, OSD directed the Air Force and Navy to investigate the potential of a joint program. No agreement was reached until the intervention of Secretary Robert McNamara. Due to differing requirements and high aircraft weight, the Navy withdrew from the program in 1968. The Air Force continued development and production.

# F-4

## DESCRIPTION:

The F-4 was specifically designed to automatically detect, identify, locate, and destroy hostile radar emitters by the use of anti-radiation missiles, stand-off guided munitions, or conventional weapons. The F-4G is classically employed in the counter-air role as an escort for the penetrating strike force or independently as a hunter-killer force against targets of opportunity. The present R&D effort is to update the capabilities of the F-4G so that it can contend with the exotic threat radars being deployed now and through the 1990s.

**LEAD SERVICE:** Navy   **PARTICIPATING:** Air Force

## JOINT DETAILS:

The F-4 was orginally developed as a tactical fighter for the Navy. The Air Force joined in early 1962 when they modified the F-4B (which was in production). The Air Force needed an intermediate aircraft to fill gaps between the F-105 and F-111A. The F-4 had performance characteristics well adapted to the high-speed, high altitude tactical requirements necessary for air superiority missions, and its low-speed, low-altitude performance qualified for close support operations. Probably the most significant factor in the F-4's success was that it was a relatively mature system when the Air Force decided to procure it.

# GATOR

DESCRIPTION:

The GATOR mine provides a means of sowing a minefield beyond the range of artillery by use of tactical aircraft carrying the TMD (Tactical Munitions Dispenser). Each TMD air delivers a payload of 94 mines, (74 Anti-Tanks (AT), and 22 Anti-Personnel (AP)). The Navy's GATOR (CBU-78/B) MK 7 dispenser will deliver 60 mines (45 AT and 15 AP). The AT mines detonate through a magnetic sensor which detects the overhead presence of an armored vehicle. The AT mine has a bidirectional mass focus warhead. The AP mines use tripwire sensors to detect valid targets and has a fragmenting case, ground-burst warhead. Both AT and AP mines, after a specific pre-set time, will self-destruct to clear the minefield for counter attack.

LEAD SERVICE: Air Force    PARTICIPATING: Navy, Army

JOINT DETAILS:

In January 1974, the Air Force formed the joint service GATOR SPO with the Navy. In December 1974, it was discovered that the Army XM-74/75 mine systems were nearly identical to GATOR. As a result, a joint program was formed with the Air Force given lead Service responsibilities, the Army had configuration management responsibility as developing agent, and the Navy provided technical assistance and support to the program.

Program #33

GLCM

DESCRIPTION:

The purpose of the Ground Launched Cruise Missile (GLCM) is to counter modernization of Soviet long-range theater nuclear forces, particularly SS-20s and Backfire bombers. The need is for a highly survivable system with enough range to reach targets in the western military districts of the Soviet Union, thus helping to deter a combined Warsaw Pact and Soviet numerical superiority in both conventional and theater nuclear forces. This program element provides for full scale engineering development to adapt the TOMAHAWK cruise missile into a tactical mobile ground launched system.

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

The Joint Cruise Missile Project Office has overall responsibility for GLCM development and testing. The January 1977 Cruise Missile DSARC II direction established the JCMPO with Navy as lead Service to manage current cruise missile development with special emphasis placed on commonality between programs. The AF GLCM is staffed by the AF within the overall auspices of the Navy director, JCMPO who is the Program Manager.

# GLOBAL POSITIONING SYSTEM (GPS)

DESCRIPTION:

The NAVSTAR GPS is a space-based, radio, positioning and navigation system that is designed to provide extremely accurate three-dimensional position and velocity information together with system time to suitably equipped users. The GPS consists of three major segments. The space segment consists of 18 satellites providing worldwide navigation signals. The control segment has monitor stations and a control center which evaluate and correct satellite performance parameters. The user segment consists of equipment necessary to process GPS satellite signals. The GPS was conceived to provide DoD forces with the ability to determine precisely their position and velocity in real time at any time and any place on or above the earth or under the sea.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

JOINT DETAILS:

The program was a conceptual combination of an Air Force program to provide navigation using satellites as signal transmitters and a Navy program which was a follow-on improvement to the operational transit navigation program. In 1973, the Deputy Secretary of Defense directed the Air Force and Navy concepts into a single GPS. All Army aircraft will use GPS to update self-contained systems. Users in front of or behind the division sector at echelons above division whose mission requires positional and navigational accuracy will employ GPS.

# GUAYULE

DESCRIPTION:

The Guayule Rubber Program is a tri-Service research and development effort for the development of a domestic source of rubber to substitute for hevea rubber in military aircraft and truck tires. The objectives of the program are: coordination of the development of the Guayule shrub; development of a program to establish a prototype refinement industry; military evaluation of Guayule manufactured end-items; and revision of applicable military specifications to permit use of Guayule rubber.

LEAD SERVICE: Navy  PARTICIPATING: Air Force, Army

JOINT DETAILS:

In 1977, each of the Services conducted an evaluation program testing Guayule rubber as a substitute for hevea rubber. Based on the results of these studies, OSD selected the Navy as the lead Service for all Guayule programs in 1980. The Navy requested in 1980 that the JLC establish a Tri-Service Technical Coordinating Group. This group was chartered in 1982 and the Program Office (PMA-277) was chartered in 1983. In addition to tri-Service involvement, other government agencies are also involved including the Federal Emergency Management Agency, and Departments of Agriculture, Commerce, and Interior.

# HARM

DESCRIPTION:

The HARM (High-Speed-Anti-Radiation-Missile) is an air-to-surface missile designed to suppress/destroy land- or sea-based radars involved in air defense systems. HARM is a third generation anti-radiation missile and succeeds the SHRIKE and Standard Arm missiles. HARM is intended to be employed on the A-7, F-18, A-6, and F-16 aircraft. Improvements over the older missiles include higher speed, longer range, improved sensitivity, in-flight retargeting, and broader frequency coverage.

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

OSD directed the establishment of a joint HARM program with the Navy as lead Service. The Navy was selected as lead Service because of technical capability based on experience in SHRIKE and Standard Arm. The Navy will pay development costs except for USAF unique development. Earlier, an OMB cut disrupted development and cost escalations have caused the Air Force to cut projected production quantities. The current issue concerns whether or not to develop a second source for production. Congress has directed second sourcing and the Navy concurred, but the Air Force does not believe a second source is required in light of reduced quantities.

# HELLFIRE MISSILE

DESCRIPTION:

Hellfire is a heliborne antiarmor terminal homing modular missile system which uses semiactive laser terminal homing guidance and a shaped charge warhead to defeat hard targets. The missile system will be employed from advanced attack helicopters against heavily armored vehicles, at longer standoff ranges, and with greater lethality than missiles currently in the inventory. Hellfire will provide accurate fire on targets acquired and autonomously designated by the attack helicopter, or remotely designated by ground observers, other attack helicopters and aerial scout helicopters. The alternate designation methods allow the attacking helicopters to essentially "fire and forget" the missile.

LEAD SERVICE: Army PARTICIPATING: Marine Corps

JOINT DETAILS:

The Hellfire has been essentially an Army program through R&D with Army funding the bulk of the development. Both the Air Force and Navy are participating in the program, though only the Navy is actually buying the missile. The Air Force put some money into R&D to look at use of the Hellfire on the A-10, but there were so many modifications required, it was not fruitful. The Navy is currently buying the missile for Cobra gunships and has asked the Army to look at a program for using the missile with fixed-wing aircraft (with some Navy funds).

# HH-60D COMBAT HELICOPTER MODERNIZATION

DESCRIPTION:

The objective of the HH-60D Combat Helicopter Modernization Program is to develop a derivative of the Army UH-60A Black Hawk helicopter to meet Air Force combat rescue and special operations mission requirements. These requirements include the replacement of obsolescent, hard to maintain equipment and to upgrade helicopter capabilities to cope with increasing threat. The Air Force will integrate improved avionics, extended range capability, more powerful engines, and necessary mission equipment into the H-70, a helicopter with proven reliability, maintainability, and combat/crash survivability.

LEAD SERVICE: Air Force (HH-60D), Army (UH-60A), Navy (SH-60B)

JOINT DETAILS:

The Air Force's HH-60D will consist of a derivative of the Army's UH-60 airframe with the Navy's SH-60 engine. Management is accomplished by Air Force Systems Command, Aeronautical Systems Division at Wright Patterson AFB, Ohio. The program managers of each Service meet periodically to discuss issues of common interest and to plan program changes of mutual benefit with the aim of retaining as much commonality as possible.

# HH-60 SIMULATOR

DESCRIPTION:

The HH-60 simulator is a flight training device used to train crewmembers in the aspects of operating either the Blackhawk, Seahawk, or Nighthawk helicopters. While each of the hawk helicopters has many elements in common, the differences are still significant enough to necessitate major differences in the operation of the simulator. This resulted in each Hawk simulator being substantially different.

LEAD SERVICE: None (Air Force, Army, Navy all run their own programs)

JOINT DETAILS:

HH-60 was considered for jointness by the Air Force in 1981. At that time, it was decided that the requirements differences were too great to make jointness viable. In addition, the Air Force Military Airlift Command did not have the funds to support a joint program until 1988, which made establishing the HH-60 Simulator program as joint impractical. For the purposes of this study, therefore, the HH-60 was considered as an "almost joint" program.

Program #40

# HIGH MOBILITY MULTI-PURPOSE WHEEL VEHICLE (HMMWV)

DESCRIPTION:

The High Mobility Multi-Purpose Wheel Vehicle (HMMWV) is intended to replace most one-quarter-ton through one and one-quarter-ton tactical vehicles in the forward areas of the combat zone. It has a number of technology advances incorporated in it designed specifically to improve its maintainability and reliability in the combat environment. It will be produced in both a lightly armored and canvas-sided version and in several configurations. All weapons-carrying and scout versions will have ballistic protection (armored version) while most troop, cargo, and ambulance versions will be canvas sided.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Marine Corp, Navy

JOINT DETAILS:

The Army is the lead Service on this joint effort as it is for all efforts in DoD on wheeled vehicles. Since this vehicle is designed to replace existing vehicles used by all Services, they are all involved in the program. The Marine Corps is perhaps the largest participating user and intends to buy it in weapons carrier, troop and cargo carrier, and two different ambulance versions.

# IR MAVERICK

DESCRIPTION:

The AGM-65D is a rocket propelled, air-to-surface guided missile that develops tracking signals from the naturally occuring thermal energy of the target. It is designed to destroy small hard tactical targets. The AGM-65D is capable of operating during day and night under adverse weather conditions. The $I^2R$ MAVERICK is compatible with the F-4D/E, A-7D, A-10, F-16, F-111D/F, and F-4G aircraft. It increases the capability of the MAVERICK weapon system by providing day/night launch and leave capability.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

In the MAVERICK family, the Air Force IR MAVERICK (AGM-65D) was developed first. The Navy version (Anti-ship AGM-65F) development used AGM-65D technology. There is not a single weapon system being developed for both Services but there is a specific interest in maintaining as much commonality as possible (now approximately 95 percent common). The management responsibility is with the MAVERICK SPO, Wright Patterson AFB, Ohio. There are 62 Air Force people assigned and Navy person authorized to the program office. The AGM-65D is in production and the AGM-65F is in FSD.

Program #42

## JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM (JSTARS)

DESCRIPTION:

The Joint STARS is a surveillance and target attack control system designed to detect, locate, and track moving and stationary targets located beyond the Forward Line of Own Troops (FLOT). The system will perform surveillance and attack planning and control functions. The airborne radar sensor broadcasts target position data in near-real time for reception at multiple ground stations. In addition, the radar transmits attack parameters to direct attack aircraft and in-flight missiles. The Air Force and Army radars will be identical and will be compatible with the following aircraft: OV-1 for the Army and C-18 or TR-1 for Air Force platform needs.

LEAD SERVICE: Air Force PARTICIPATING: Army

JOINT DETAILS:

On 19 May 1982, a USDR&E memorandum directed that a joint Air Force/Army program management office be established to develop and acquire a reconnaissance, surveillance, and target acquisition capability. The joint STARS program was organized from the PAVE MOVER (Air Force) and SOTAS (Army) program offices. The Joint Program Office is at Air Force Systems Command's Electronic Systems Division. An integrated Army and Air Force office will guide the full scale development.

# JOINT TACTICAL MISSILE SYSTEM (JTACMS)

DESCRIPTION:

The Joint Tactical Missile System (JTACMS) (formerly the Corps Support Weapon System) was originally intended to meet the Army's requirement for an improved conventional, nuclear and chemical weapon system to attack targets important to the corps at ranges beyond the capability of cannons and rockets. In essence, it was intended to be a replacement for the Lance missile.

LEAD SERVICE: Army PARTICIPATING: Air Force

JOINT DETAILS:

The USDR&E restructured the Army's Corps Support Weapon System (CSWS) and the Air Force's Close Support Weapon (CSW) into a single joint program. The objective of the joint program was to field a basic missile with maximum commonality which meets the needs of both Services. A Joint Program Office was formed at Redstone Arsenal, Alabama, and tasked to develop a missile system which would satisfy the stated requirements of the two Services. The Air Force's requirements included a longer range than the Army and a need for in-flight or terminal guidance to hit point targets.

It now appears likely that, due to difficulty resolving requirements differences, the Services will each develop their own system.

# JOINT TECHNOLOGY DEMONSTRATION ENGINE (JTDE)

DESCRIPTION:

The purpose of the JTDE project is to conduct exploratory development on advanced turbine engine component technologies to provide superior turbopropulsion systems for future military missions. This project develops technology to increase propulsion system operational reliability, cycle flexibility, and performance while reducing fuel consumption, weight, and acquisition and operational support costs. Both analytical and experimental efforts are conducted in fans and compressors, high temperature combustors, turbine and seals, controls, diagnostics and structural design techniques. This project considers the total propulsion system (inlet, engine, nozzle) and its integration into a weapon system.

LEAD SERVICE: None, Shared by Navy and Air Force

JOINT DETAILS:

The Commanders of the Air Force Aero Propulsion Laboratory (AFAPL) and the Naval Air Propulsion Center (NAPC) developed a Joint Advanced Development Plan (JADP) to meet each Service's needs. Then each Service contracted with four engine contractors to execute the JADP. Joint Air Force/Navy Statements of Work were prepared for joint areas of interest prior to contract award. After contract award, joint Air Force/Navy and Air Force/Navy/Industry Program Reviews were conducted. JTDE is a continuing program within the Aerospace Propulsion PE 62203.

# JOINT TACTICAL FUSION (JTF)

DESCRIPTION:

Joint Tactical Fusion is a program designed to bring together the inputs of the many intelligence gathering systems of the Army and Air Force, process the information, and provide real time targeting and maneuver information to Commanders. The program is a combined result of the Air Force's Enemy Situation Correlation Element (ENSCE) and the Army's All Source Analysis System (ASAS) and will take advantage of technology of other related DoD programs. It is the purpose of the program to develop some hardware for the tactical environment and software to integrate the system. To date, several extensive tests have been run using a system installed in Europe to meet that commander's immediate need.

LEAD SERVICE: Army PARTICIPATING: Air Force

JOINT DETAILS:

Army and Air Force are working this program as a joint development. Earlier systems of both Services will be integrated into the program and hardware is being designed with capabilities sufficient for both Services. The program will integrate information from Air Force space and airborne systems, Army ground and airborne collection systems, then provide targeting data for commanders of both Services in the operating theater.

# JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM (JTIDS)

DESCRIPTION:

JTIDS is a high-capacity, jam-resistant secure digital communications system with navigation and identification capabilities. JTIDS consists of Class 1 terminals (for large $C^2$ centers, large aircraft), Class 2 terminals (for small $C^2$ centers, fighters) and Adaptable Surface Interface Terminals (ASIT).

LEAD SERVICE: Air Force PARTICIPATING: Navy, Army

JOINT DETAILS:

In 1974, OSD directed the Services to form a joint program to develop and produce a TDMA data link. The Air Force was selected as lead Service and a joint SPO was formed at ESD. The Air Force determined that JTIDS would not meet the immediate needs for AWACS and began separate development of a JTIDS system for the E-3 using a unique message standard (IJMS). Testing of the TDMA JTIDS system revealed shortcomings for the Navy mission. In 1981, the DSARC directed the Air Force to continue development of TDMA and tasked the Navy to look at DTMA JTIDS. The Navy moved its JTIDS personnel to Washington and has a separate JTIDS office for the DTMA system. The Air Force is now looking at DTMA also, but is establishing a separate SPO for this (EJS SPO).

The Army is participating with the Air Force in the full scale developemnt of the Class 2 terminal and will also procure four ASITs to provide a near term capability for the Central Command.

Program #47

# JVX

DESCRIPTION:

The JVX is a tilt-rotor, multi-mission VTOL aircraft. The technical concept is based on the NASA XV-15 tilt rotor research vehicle. The primary purpose of the aircraft is performance of a number of medium-lift class missions including: med-evac; assault lift; special operations; search and rescue; and electronic intelligence and warfare. The aircraft is being developed by a consortium of Bell Helicopter and Boeing Vertol.

LEAD SERVICE: Navy

PARTICIPATING: Air Force, Army (Withdrawn)

JOINT DETAILS:

OSD review of the Services' FY83 POM submittals identified an opportunity to meet a number of requirements with a common vehicle based on the XV-15. The Services concurred and OSD established the JVX development program with the Army as lead Service. A tri-Service JSOR group was established and a JSOR developed and agreed to by all parties. Preliminary design contract was awarded, but the Navy was named lead Service just before contract award. Change in lead Service was a product of a renegotiation of the cost sharing agreement that required the Navy to pay a larger share of the development. Once preliminary design was under way, the Army withdrew from the program based on affordability factors of high unit cost for a relatively low priority mission need. The Army has indicated that it might consider purchase of the JVX at a later date for different missions. The Air Force remains in the JVX program at this time.

# LIGHT ASSAULT BRIDGE (LAB)

DESCRIPTION:

The Light Assault Bridge is intended to be a remotely launched and retrieved, air-transportable bridge similar to the Armored Vehicle Launched Bridge (AVLB) currently in use by the U.S. Army. The requirement for air transportability limits the width to 3.4 meters and the load carrying capability to load class 30. It will, however, be capable of crossing all vehicles used by the light forces it is intended to support. It will be trailer mounted and can be unplaced or retreived by crew members while inside an armored vehicle. It is suitable for bridging small gaps, streams, and ravines quickly and while under fire.

LEAD SERVICE: Army PARTICIPATING: N/A

JOINT DETAILS:

At the beginning of this program, the Marine Corps was interested and a concerted effort was made to work out a joint requirement which would satisfy both Services. Since the Marine Corps intended to buy only one type of assault bridge, it would have to be able to cross M60 tanks. The Army has no need to cross tanks on the light bridge and in fact could not satisfy the air transportability requirement with a bridge that heavy. (The Army uses the AVL13 to cross tanks). Since the requirements could not be worked out, the program did not go joint and the Marines are looking at a modified version of a heavy assault bridge like the AVLB.

Program #49

# LASER MAVERICK

## DESCRIPTION:

The AGM-65E Laser Maverick was developed to satisfy Navy/Marine Corps operational requirements for an air-to-surface missile and to provide close air support, strike and interdiction missions against land and sea targets. The Marine Corps' Laser Maverick operational concept employs A-4M, A-6E, AU-8B, and F/A-18 launch aircraft. The targeting modes include ground remote designation using MULE, or GLLD methods, airborne remote designation using A-6E with TRAM or OV-IOD with NOS, or airborne self-contained designation of the A-6E/TRAM. Although the Air Force no longer has any requirements for a laser guided missile, the Air Force was chosen to manage the AGM-65E program as a follow-on to the Air Force laser program which was an extension to the GM-65DIIR Maverick program.

**LEAD SERVICE:** Air Force     **PARTICIPATING:** Navy

## JOINT DETAILS:

A full time assistant deputy program manager for Laser Maverick is assigned by the Navy from the Marine Corps to the Air Force Program Office. The Deputy Program Manager (DPM) is assigned to PMA-242 in NAVAIRSYSCOM, Crystal City, Virginia. Joint Operating Procedures will be negotiated and executed between the Air Force and Navy as required to further define the procedures to be followed by each Service. In general, the development of the AGM-65 missile system will be funded by the Air Force. Items unique and peculiar to the Navy, such as OPEVAL tests and associated hardware will be funded by the Navy.

# LIGHT ARMORED VEHICLE (LAV-25)

DESCRIPTION:

The LAV-25 is a near term solution to the Army and Marine Corp need for a lightweight, strategically deployable, protected, assault-capable antiarmor system. The long term solution is another joint program called the Mobile Protected Gun System (MPGS). The LAV-25 is essentially an off-the-shelf system designed to fill the immediate needs of the Army and Marines for an air transportable, armored assault vehicle. The vehicle is an eight-wheeled armored vehicle armed with 25mm Bushmaster Chain Gun.

LEAD SERVICE: Army PARTICIPATING: Marine Corps

JOINT DETAILS:

During the conduct of this study the Army pulled out of the LAV-25 program. The vehicle's inability to defeat threat armor (due to the small size of its main weapon) was the driver of the Army's decision. The vehicle is in production and the Marine Corps intends to continue the program. Both Services continue their efforts in the long term program.

Program #51

LLLGB

DESCRIPTION:

The LLLGB is the third generation of the LGB family. Compared to the LGB I and the LGB II, LLLGB expands the delivery envelope to include low altitude (200 ft) level launches while improving delivery flexibility. Accuracy and resistance to wind motion are also improved. LLLGB is resistant to electro-optical countermeasures and capable of operation in a multi-laser environment. LLLGB guidance kits are being developed for the MK-82 (500 lb) and MK-84 (2000 lb) bombs. Delivery aircraft are the F-4, F-111, A-7, and A-10.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The LLLGB Program Office is at Armament Division, Eglin AFB, Florida. The Navy will buy approximately 5000 of the production articles for the Marines while the Air Force is buying 50,000. There has not been a production decision made yet.

# MODULAR AUTOMATIC TEST EQUIPMENT (MATE)

DESCRIPTION:

Previous and current methods used to specify, design, build and support automatic test systems have resulted in a proliferation of equipment, inadequate operational reliability and supportability, and excessive life cycle costs. Weapon system availability (force readiness) has suffered because of malfunctioning automatic test equipment at all levels of maintenance. The Modular Automatic Test Equipment (MATE) program has developed a set of guides which delineate a standard architecture and a management system for automatic test system (ATS) acquisition and support that will establish a framework for the acquisition and support of future military automatic test systems.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

JOINT DETAILS:

The MATE program is run by the Air Force with Army and Navy coordination through the JLC Panel on Automatic Testing. The Navy plans to use MATE after the Air Force has completed development. The Army may use MATE at some future time.

# MOBILE ELECTRIC POWER (MEP)

DESCRIPTION:

The Program Manager Mobile Electric Power (PM MEP) is a DoD directed office responsible for R&D and procurement of all power generation equipment for the Services. The program was initiated during Vietnam to reduce the number of non-standard generators being bought by the Services. The current PM shop has established a standard list of generators across the spectrum of power requirements, and only those can be used without special permission. The PM recently was given an R&D mission and is beginning that function with work in silent generators and methanol fuel cells.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Navy, Marine Corps

JOINT DETAILS:

The PM MEP was established essentially as a standardization PM, but over the years its scope has increased. It currently has split out all phases of management of generators by size. The responsible Service procures for the other Services including the repair parts, and runs the depot maintenance program. Under a JOP there is a cost sharing agreement which forces penalties on a Service which fails to fund planned procurement.

# MILSTAR

DESCRIPTION:

The Military Strategic-Tactical and Relay (MILSTAR) satellite system is now being developed by the DoD as the cornerstone of a communications, command, and control system capable of surviving an all-out nuclear war. MILSTAR will assure jam-proof global communications for mobile strategic and tactical forces in the event of such an attack. It does not replace any of the existing communications networks for transmitting high-priority messages (DSCS, FLTSATCOM, Satellite Data System), rather it adds a new ultrasecure and survivable means of communications to the existing system. The system will encompass at least seven earth-orbiting satellites and more than 4000 earth terminals.

LEAD SERVICE: Air Force PARTICIPATING: Navy, Army

JOINT DETAILS:

The Air Force heads the MILSTAR Joint Program Office (JPO). They will fund and manage the development and acquisition of the satellite mission control segments of the MILSTAR System. Each Service funds and manages separately (different SPO) a terminal program (Air Force for airborne, Navy for shipborne, and Army for ground).

Program #55

# MOBILE PROTECTED GUN SYSTEM (MPGS)

DESCRIPTION:

The Mobile Protected Gun System is to be a lightweight, antiarmor, assault-capable, combat weapon system that can be deployed by both strategic and tactical airlift aircraft. It is in response to the Services' inability to aerially deploy heavy main battle tanks quickly and in any great numbers. The MPGS is a long term solution to this problem and is in very early stages of development. The LAV-25 is the Services' short term solution to this problem. The new system will take full advantage of new technology developments to maximize its mobility, lethality, and survivability in a light weight state-of-the-art combat assault vehicle. Sizes of cannon are being considered as its main armament. The primary candidate is a new 75mm cannon with improved anti-armor ammunition.

LEAD SERVICE: Army PARTICIPATING: Marine Corps

JOINT DETAILS:

The MPGS is a joint Army-Marine Corps development to meet a requirement for a long term light anti-armor weapon system. A JSOR was worked out between the two Services and some trade-offs were made. The future of the program is in some doubt since the Army pulled out of the LAV-25.

Program #56

MEDIUM RANGE AIR-TO-SURFACE MISSILE (MRASM)

DESCRIPTION:

The MRASM-Medium Range Air-to-Surface Missile fulfills the needs of the Air Force for an air-launched conventional standoff missile capable of being employed against tactical targets by aircraft of the Strategic Air Command and the Tactical Air Forces. This standoff missile is needed to destroy well protected, high value targets rapidly while minimizing the exposure of launch aircraft to the massive quantity of current and projected enemy lethal air defense systems. Air Force analysis concluded that the optimum solution to this need, based on range, payload, survivability, growth potential, and technical risk assessment, would be met by a subsonic, low flying cruise missile system.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

The majority of early R&D funds were Navy. Air Force participation in the form of funding came slightly later when the Navy zeroed their funds in their FY84 POM. A deal was struck at a high level that the Navy would provide only a modest contribution. Limited Navy funds are now being applied to elements and components "common" to both the Air Force and Navy variant designs. While MRASM initially was to be used by the Air Force on F-52H and F-16 aircraft, TAC never liked the MRASM approach because it was too expensive and too inflexible. SAC is now the sole user of MRASM.

Program #57

MULTI-SERVICE COMMUNICATIONS SYSTEM (MSCS)

DESCRIPTION:

The MSCS program office is responsible for the development of a diverse family of communications equipment which is part of the TRI-TAC system. The Army is the executive service and funds development of its assigned systems. The program manager also monitors a series of other TRI-TAC development efforts led by the Navy, Air Force, and Marine Corps. The study team focused on the development history of one type of equipment, the AN/TTC-39 family of switches.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Marine Corps

JOINT DETAILS:

Equipment specifications and performance characteristics are coordinated with other TRI-TAC participants. R&D is funded and managed exclusively by the Army and each service funds its own production items.

Program #58

## MULTIPLE STORES EJECTOR RACK (MSER)

DESCRIPTION:

The multiple stores ejector rack (MSER) system will involve two racks: a two position side by side rack (BRU-34), and a four position dual tandem rack (BRU-35). The MSER system consists of three major subsystems: the strongback assembly, the ejector unit, and the electronics assembly. The two racks are intended to use identical ejector units.

The MSER system will be capable of supersonic carriage, release, and emergency jettison munitions ranging from the small lightweight BDU-33 practice bomb to large heavyweight stores such as the MK83. The BRU-35 will be adaptable to the unique F-15 jettison feature. Carriage and release of stores will be possible to Mach 1.4 or 700 KCAS on a MIL-STD-210 hot day. To permit compatibility with the A-10 aircraft, the minimum delivery airspeed must be 250 KCAS required and 200 KCAS desired.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

A March 1976 message from the Joint Air Staff/Chief of Naval Operation stated the need for a joint Service program to develop aircraft/stores interface equipment as soon as possible. A SPO was formed with the Air Force providing business and technical management and the Navy providing a Deputy Program Manager to oversee the Navy's interests. The MSER will provide operational capability on the F-15, F-16, F-18, A-10, and AV-8B aircraft.

Program #59

## M-198 HOWITZER

DESCRIPTION:

The M-198 Howitzer is a medium weight, 185mm towed weapon that is deliverable by rotary (CH47C or larger) and fixed wing cargo aircraft. It provides an increase in range reliability and maintainability over the standard towed M114 family of Howitzers. The M-198 will be employed as a general support weapon and replace the M114A1/A2 and 105MM weapons. It is designed to fire stockpiled 155MM ammunition as well as newly developed ammunitions.

LEAD SERVICE: Army PARTICIPATING: Marine Corps

JOINT DETAILS:

The M-198 Howitzer is a "joint buy" program. The Army and the Marine Corps have a need for a light weight towed Howitzer with the range of a 155mm gun. Since the Army had an ongoing program which satisfied the Marine Corps need, they are buying the weapon exactly as the Army is producing it.

# ON BOARD OXYGEN GENERATION SYSTEM (OBOGS)

DESCRIPTION:

The OBOGS (On Board Oxygen Generation System) is a life support system for aircraft. It provides oxygen enriched air to the crew via the molecular seive technology. This method eliminates the hazards and logistics burden of the conventional liguid oxygen system now in use.

LEAD SERVICE: Navy PARTICIPATING: Army, Air Force

JOINT DETAILS:

Each Service has been developing an OBOGS system, the Navy, currently in production with the AV-8B aircraft, is the furthest along. In 1983, the JLC formed an OBOGS Ad Hoc Group which allows each Service to maintain a separate program, while working toward common requirements and specifications. This is a confederated program.

# PACER SPEAK

## DESCRIPTION:

The PACER SPEAK program provides a new family of radios to replace unsupportable tactical equipment. All PACER SPEAK radios are built around a common core element (RT-1319/URC). Various COMSEC, ECCM, and installation unique components are added to the common core creating the following variants:

| Unit | Designation |
|---|---|
| Ground | GRC - 206 |
| Man-Pack | TRC - 113 |
| Transportable | TRC - 176 |
| Vehicular | VRC - 83 |

**LEAD SERVICE:** Air Force **PARTICIPATING:** Army, Marine Corps

## JOINT DETAILS:

This program was not directed to become joint. Jointness came about by consensus of the logistics personnel of all the Services. There is no indication that there was a need for any requirements compromises among the Services. The Air Force added a Have Quick module to the basic radio to meet its requirements. The Army withdrew from the program due to the preceived technical risks related to the Air Force requirement of the Have Quick interface.

# POSITION LOCATION REPORTING SYSTEM (PLRS)

DESCRIPTION:

PLRS is an automatic, computer-controlled UHF (line of sight) network which provides secure position location and navigation information, on demand, to all authorized users. A typical network consists of 2 Master Stations (MS), a variable number of manpacks, vehicle mounted and airborne user units (UU) (up to a max of 400 per Master Station) tailored to the specific requirements of an Army division. The Master Unit has a capability to display reported positions, provide position location to users, and even guide aircraft to a target. A Preplanned Product Improvement is under way which will combine this system with the Joint Tactical Information Distribution System (JTIDS) and increase the system capability.

LEAD SERVICE: Army PARTICIPATING: Marine Corps

JOINT DETAILS:

The PLRS program started as a Marine Corps program which was brought to the attention of the Army TRADOC Commander in the early 1970s. It was originally rejected by the Army because it was line of sight. Under pressure from Army TRADOC CG, the Army joined the program in 1973 and in 1975 took over as the lead Service.

# ROWPU (600 GPH)

DESCRIPTION:

The Reverse Osmosis Water Purification Unit is essentially a military adaptation of commercial equipment. The unit is capable of producing potable water from sea water or brackish water sources at the rate of 600 gallons per hour. With special procedures and water testing equipment, it can produce potable water from CBR contaminated sources at a slightly lower output rate. This is state-of-the-art water purification equipment which replaces equipment currently in use by all services.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Marine Corps

JOINT DETAILS:

The program was originally developed to upgrade the Army's water purification capability. The capability of the equipment attracted the interest of the Services involved in the RDJTF and associated missions in the middle east. The Army's Mobility Equipment Labs, funded the R&D and the Air Force and Marines tested and fielded the prototype units. The Air Force used the equipment in the Ascension Islands in support of British operations in the Falklands, and the Marine Corps used the 600 GPH unit in support of their troops in Lebanon.

Program #64

SAHRS

DESCRIPTION:

The AN/USN-2(V) Standard Attitude Heading Reference System (SAHRS) was initiated to provide Army, Navy, and Air Force users with a common reference system to be used on various platforms. This system will provide improved system readiness and reduced life cycle costs or existing systems, and will be designed to facilitate replacement of existing systems.

LEAD SERVICE: Navy PARTICIPATING: Army, Air Force

JOINT DETAILS:

This program originated in the Joint Services Requirements Committee (JSRC) with the development of a standard system. The Navy was designated as the lead service. The Navy and Army have agreed to split the development costs and the Air Force will provide some technical support. There is no formal program office, but the Navy provides a part-time acquisition manager who coordinates with the other services as required. The program's major problem is funding. The project is so low on each Service's priority list that major funding perturbations occur regularly.

Program #65

# STANDARD CENTRAL AIR DATA COMPUTER (SCADC)

DESCRIPTION:

The SCADC Modification program replaces obsolete, low reliability, airborne air data computers with a new, state-of-the-art, solid state central air data computers. The SCADC increases reliability, improves maintainability, and enhances interoperability.

LEAD SERVICE: Air Force PARTICIPATING: Navy

JOINT DETAILS:

PMD R-P 1045(1)/64201F02771, 23 March 1981, directed the development of a standard central air data computer suitable for Air Force and Navy installation in new weapon systems or as retrofit to existing weapon systems. The PMD directed a joint AFSC/AFLC effort to design, develop, test, and qualify the SCADC. A development Request for Proposal (RFP) was released in April 1981 and development contracts were issued to two contractors (Marconi and Garrett) in September 1981.

# SINGLE CHANNEL OBJECTIVE TACTICAL TERMINAL (SCOTT)

DESCRIPTION:

SCOTT, a tactical communications terminal, is part of the MILSTAR system. This ground terminal is to be issued at the brigade level in the Army and Marine Corps and will provide the Commander the ability to use the Defense Satellite Communications System. The terminal operates in the extremely high frequency (EHF) band and has frequency hop capability, plus gives the tactical commander greatly improved communications capability.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Marine Corps

JOINT DETAILS:

The Army has developed this program as the executive agent for ground terminals in the Defense Satellite Communications System. Since both the Marines and Air Force have requirements to use the MILSTAR system, they will be users of this equipment.

Program #67

# STANDARD FLIGHT DATA RECORDER (SFDR)

__DESCRIPTION__:

The Standard Flight Data Recorder (SFDR) will record aircraft data that may be used to support incident investigation and maintenance. The SFDR will be a modular, microcomputer-based system with three components: a Signal Acquisition Unit (SAU), a Memory Unit (MU), and an additional bulk memory identified as the Auxiliary Data Collection Unit (ADCU). The physical, electrical, and data format interface between the SAU and MU shall allow for interchangeability between different vendors' designs.

__LEAD SERVICE__: Air Force __PARTICIPATING__: Army, Navy

__JOINT DETAILS__:

The SFDR began as a tri-Service joint program. A working group was established in January 1982 to develop a SFDR specification. In January 1983, the F-16 SPO received direction and funding to develop a SFDR to meet F-16 data and schedule requirements while maintaining standardization through cooperative management.

# SLCM

DESCRIPTION:

The TOMAHAWK conventional land-attack mission requirement is to counter the threat against U.S. naval forces by destroying primarily: air-launched anti-ship cruise missiles, their support facilities, and their carriers on the ground; fleet command and control systems; ships and submarines in port; and suppressing ground-based air defense systems to enhance carrier aircraft penetration. The anti-ship TOMAHAWK mission requirement is to redress the current Soviet anti-ship cruise missile stand-off range advantage and to complement U.S. sea-based aircraft strikes against combatant ships which have effective air defense systems. The mission requirement for the nuclear land-attack TOMAHAWK is to provide the Navy with a highly survivable and distributed worldwide theater nuclear capability, by complementing carrier aircraft, to strike selected naval targets ashore and other fixed targets in support of national policy. The long range TOMAHAWK Cruise Missile Weapon System, with land-attack and anti-ship applications, is sized to fit submarine torpedo tubes and is capable of being launched from a variety of subsurface, surface, air, and land platforms against both land and surface ship targets.

LEAD SERVICE: Navy

PARTICIPATING: Part of Joint Cruise Missile Program Office (JCMPO)

JOINT DETAILS:

The Joint Cruise Missile Project Office (JCMPO) has overall responsibility for SLCM development and testing. The January 1977 Cruise Missile DSARC II direction established the JCMPO with Navy as lead service to manage current cruise missile development with special emphasis placed on commonality between programs.

# SQUAD AUTOMATIC WEAPON (SAW)

## DESCRIPTION:

The SAW is a lightweight, one-man portable machine gun. The weapon will fire the new 5.56mm heavy bullet, which increases its range to almost twice that of the M16A1(AR) which it will replace. The SAW will be issued on a basis of 2 per rifle squad. The weapon, bipod, and basic load of 200 rounds weighs barely 22 pounds. The SAW is produced in Belgium by Fabrique Nationale.

**LEAD SERVICE:** Army **PARTICIPATING:** Marine Corps

## JOINT DETAILS:

The program got off to a rocky start because the Army and Marine Corps could not agree on the caliber of the weapon. Until the advent of the heavy 5.56mm round, the Marine Corps was insisting on a 7.62mm gun to provide the range and firepower required. The program has had serious funding problems in both Services. At the time the study group visited the program office, budget cuts were threatening to delay establishment of a CONUS production facility.

# STANDARD ARM

DESCRIPTION:

STANDARD ARM is a short-range, inexpensive, anti-radiation weapon for a specific frequency band of Soviet Radars. It is a quick reaction program which uses off-the-shelf hardware (in this case, 20 year old Sidewinder semi-active radar seekers (AIOM-9C)).

LEAD SERVICE: Navy PARTICIPATING: Air Force

JOINT DETAILS:

The requirement for an anti-radiation missile system more advanced than SHRIKE was established by the Chief of Naval Operations in July 1966 as the result of active Air Force interest in the development of such a system. From July 1966 until December 1966, parallel development efforts were conducted by the Navy and Air Force to define and demonstrate a feasible "Interim ARM" capability. DDR&E, by memorandum of 1 December 1966, directed that Standard ARM development be pursued on on a priority basis under the management of a joint project office in the Naval Air Systems Command. The DDR&E memorandum specified that the Air Force provide a senior officer as deputy project manager.

# STANDARD SIMULATOR DATA BASE

DESCRIPTION:

The Defense Mapping Agency integrates a variety of data sources to produce a digitized data base. This data base is used as a training device to present the outside-the-cockpit scene to the aircrew as visual, ground-mapping radar, infra-red, or other sensor information. Since, the ones and zeros which compose the digitized data base cannot be presented directly, they must be manipulated to return them to a real world form. A data base transformation program performs this function.

Any data base which DMA produces is formatted and detailed according to the specification in effect at the time of production. Any change in that specification requires changes in the transformation programs which will be used to process the data base. The specifications has been changed approximately every three or four years.

There are no theoretical reasons that prohibit DoD from maintaining a single data base transformation program. The government could then provide a program training device to manufacturers as GFE and could revise it concurrently with data base specification changes. Thus, the Services would no longer be paying for multiple programs and multiple updates. This would make some of the products (for example, to the DMA data base) transportable between training devices.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

JOINT DETAILS:

New start FY84. The program was initiated through the Joint Technical Coordinating Group on Simulators and Training Devices. It then received JLC sponsorship and a tri-service working group was formed.

# STINGER

DESCRIPTION:

Stinger is a lightweight, man portable, shoulder-fired anti-aircraft missile which replaces the Redeye missile. Its improvements over Redeye are: a) Stinger can engage targets from all angles as opposed to tailchase only for Redeye, b) Stinger has some limited IFF, and c) it can defeat targets moving at much faster speeds. There is an extensive Product Improvement Program under way called "Stinger POST," which will provide an IR countermeasures capability.

LEAD SERVICE: Army

PARTICIPATING: Marine Corps, Air Force

JOINT DETAILS:

Stinger has been an Army developed "joint buy" program. Both the Marine Corps and the Air Force use the Redeye missile and are buying Stinger to upgrade their anti-aircraft capabilities.

Program #73

# JOINT TACTICAL SHELTERS

DESCRIPTION:

This is the program initiated by Congress to reduce duplication in R&D in tactical shelters. Much work is being done at Natick Labs to develop a family of International Standard Size and expandable shelters which will meet all services' needs.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Marine Corps

JOINT DETAILS:

DoD has organized a Joint Committee on Tactical Shelters (JOCOTAS) which looks at the Services' shelter programs. Currently, Program Managers who have a need for a shelter other than the ones in existence or in development at Natick Labs must get permission to develop a new shelter. The JOCOTAS has no real authority and cannot really force compliance with the intent of Congress' directive.

Program #74

TAKR

DESCRIPTION:

The Fast Logistic Ship Program (TAKR) is tasked with providing ships the capability to expeditiously load and unload military vehicles and equipment. This program involves procuring eight SL-7 class high speed container, ships, and converting them to a cargo configuration designed for rapid loading and unloading of military equipment, including tanks and helicopters.

LEAD SERVICE: Navy PARTICIPATING: Army

JOINT DETAILS:

The Services and DoD have been aware of the decline in the U.S. Merchant Marine over the years. An unsolicited proposal was received to purchase the SL-7 ships, and Congress directed the procurement and conversion. The program is 100 percent Navy funded, but some of the 1982 funds were obtained from Congressional reprogramming of funds intended for Army pre-positioned warehouses. The program is managed by the Navy and the Army provides a part-time liaison. Major program decisions are coordinated with the Army.

Program #75

TENT, EXPANDABLE, MODULAR, PERSONNEL (TEMPER)

DESCRIPTION:

TEMPER is a new type of tent designed to replace six types of obsolete, pole-supported tents. It will provide unobstructed floor space, improved mobility (due to ease of erection), ventilation, and environmental protection. During the development of TEMPER, a lot of work was done to use newer, lighter fabrics and metal alloys for the frame. Sections of TEMPER can be joined together in several configurations, which make it particularly useful in hospital and dining facility applications.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Navy, Marine Corps

JOINT DETAILS:

Although TEMPER was originally the answer to an Army requirement to upgrade its general purpose tents, its usefulness in field hospital applications became quickly apparent. The Surgeon Generals of the three Services are staunch supporters of the tent, and both the Army and Air Force Surgeons were putting up funds to purchase the tent even before it was type classified.

# TIPI

DESCRIPTION:

The TIPI/MAGIS/MAGIIC systems are designed for deployment to forward areas with tactical airborne reconnaissance units in order to support imagery exploitation aids. The systems are air, land, and sea transportable and consist of 8x8x20 foot militarized shelters as well as environmental control and power distribution subsystems which support worldwide deployment to a wide variety of operational areas.

LEAD SERVICE: Air Force    PARTICIPATING: Marine Corps, Army

JOINT DETAILS:

The Marine Corps counterparts to the Air Force commands are the Marine Corps Development and Education Command (MCDEC) as a participating command and Fleet Marine Force Pacific (FMFPAC) and Fleet Marine Force Atlantic (FMFLANT) as participating and operating commands. The Deputy Chief of Staff, Installations and Logistics, HQ Marine Corps will represent the supporting command. Direct liaison with these units is authorized for technical matters and routine program management. However, AF/RDRM and CMC (Codes INT and RD) should be informed on all such correspondence. All policy matters will be routed through HQ USAF/RDR and CMC/INT. The Army counterparts to the Air Force commands are DARCOM (materiel developer) and TRADOC (combat developer) as participating commands.

# T-46 NEXT GENERATION TRAINER

DESCRIPTION:

The T-46A program is a development and acquisition effort to replace the operationally deficient T-37 aircraft to ensure that the primary flight training capability exists beyond 1986. Forecast increases in USAF pilot training and the fact that the aging T-37 will begin to reach fleet insufficiency around 1986, dictate an Initial Operational Capability for the T-46A in 1987. The essential design characteristics include twin engines, side-by-side seating, and pressurization with significant improvements in performance (range, climb capability, sustained "g"), maintainability, and noise pollution.

PARTICIPATING SERVICES: Air Force, Navy

JOINT DETAILS:

The T-46A is not a joint program, but for purposes of this study was labeled as an "Almost Joint" program.

Program #78

VHSIC

DESCRIPTION:

This is a tri-Service program to develop two generations of integrated circuits with very high data processing capacity for a wide range of military systems. Initial applications will be in digital signal processors for radar, antisubmarine warfare, communications, missile guidance, electronic warfare, and optical sensor systems. Payoff in these systems will include enhanced performance and reliability and reduced life-cycle cost. Many systems will not be achievable without this component technology. The program structure stresses ready access to the technology by military system designers and rapid introduction of these components into the operational inventory. By Congressional direction, the program is centrally managed in the Office of the Under Secretary of Defense for Research and Engineering, and the Air Force budgets for and administers the total program funding.

LEAD SERVICE: OSD

PARTICIPATING: Army, Navy, Air Force

JOINT DETAILS:

This is a tri-Service program with management and technical oversight executed by the Office of the Under Secretary of Defense for Research and Engineering. The Program Director, in the Office of the Under Secretary of Defense for Research and Engineering, coordinates the work within the program and work related to it. An Executive Committee chaired by the Deputy Under Secretary of Defense for Research and Engineering, Research and Advance Technology, with participation by the Services and other concerned agencies, exercises oversight and sets program policy. Technology is generic and of vital interest to all three Services; many deliverables have multi-Service applications.

# VOLCANO

DESCRIPTION:

Volcano is a mine dispenser designed to be either vehicle or aircraft mounted and to scatter a number of mines in a short period of time. The Volcano uses the Gator mine which is being developed by the Air Force. It is capable of laying a mine field 100 meters long with one mine/meter front in 30 minutes.

LEAD SERVICE: Army PARTICIPATING: Marine Corps

JOINT DETAILS:

This was not an official joint program, since the Marine Corps was only coordinating on the program and had no formal agreement to support it. If the Marines did "buy in," the dispenser would have to be modified to be water-proof enough to remain operational if the assault vehicle went underwater temporarily. At the time the study group visited the program office, no decision had been made on formal Marine participation.

Program #80

# WWMCCS INFORMATION SYSTEM (WIS)

DESCRIPTION:

The WIS Program is a modernization of the existing WWMCCS automated data processing (ADP) hardware and software. The existing WWMCCS Honeywell 6000-based ADP system is technically obsolete, very expensive to maintain, and does not satisfy user requirements for additional processing capabilities and flexible interactive crisis management planning applications. ADP hardware of 27 existing WWMCCS sites will be modernized as well as over 4 million lines of joint mission software. An additional 15 million lines of service-unique software will be subsequently modernized by the individual services. The WIS architecture will utilize a local area network concept that will tie together the new ADP processors, message handling equipment, and common user support equipment which will allow for a gradual phase out of the existing WWMCCS ADP hardware without disrupting WWMCCS operations. WIS will also interface with the Defense Data Network.

LEAD SERVICE: Air Force PARTICIPATING: Army, Navy

JOINT DETAILS:

The Chief of Staff of the Air Force is the Executive Agent. The WIS Joint Program Manager (JPM) functions under the CSAF and reports through the JCS to the OSD. The IWS JPM is cognizant of all portions of the WWMCCS ADP system and directly controls the development of the joint portions of the WIS modernization. Services/Agencies will be responsible for providing acquisition funds and forwarding common functional requirements to the JCS through the Joint Requirements Integration Manager (JRIM). The System Program Office at Electronics Systems Division has been tasked with the development and acquisition responsibility.

Joint-Service personnel have been integrated into the program via the Joint Program Management Office in Washington, D.C. Joint Manning has not yet been authorized for the System Program Office (SPO) at Electronic Systems Division (ESD). Each Service does plan to form a separate, subordinate, program office to address Service-unique responsibilities over and above those assigned to the Joint Program Management Office of the ESD SPO.

# 40MM AMMUNITION (DP)

DESCRIPTION:

40mm Dual Purpose Ammunition is essentially a product improvement of the 40mm grenade. The older ammunition had only an anti-personnel application. The new 40mm HEDP has an additional anti-armor capability. It is designed to be used with the MK19 40mm Machine Gun against point targets, light armor, and personnel.

LEAD SERVICE: Army

PARTICIPATING: Navy, Marine Corps

JOINT DETAILS:

The MK19 machine gun was developed by the Navy some time ago and was used by them and the Coast Guard on small boats. When the Army decided it could use the weapon, it wanted an anti-armor capability. The new ammunition will be used by all Services using the MK19.

Program #82

## 5-TON TRUCK (M939)

DESCRIPTION:

The M939 5-ton cargo truck is an extensive Product Improvement of the M809 series truck. The new truck, which uses the same engine as the M809, has several new technology advantages over the old truck. The primary one is the "Enhanced Mobility System" developed by AM General which allows the driver to change tire pressure to accommodate road and weather conditions with the flip of a switch. The change can be made while on the move and is designed to inflate or deflate the ten tires simultaneously to pressures between 75 and 10 PSI. This change increases ground contact of the tires and enhances mobility of the truck significantly.

LEAD SERVICE: Army

PARTICIPATING: Marine Corps, Air Force, Navy

JOINT DETAILS:

This was a single Service development effort by the Army with a joint "buy-in" in production. All services were using the M809 cargo truck and the M939 is intended to replace the M809 series as they are phased out.

Program #83

# 9MM PERSONAL DEFENSE WEAPON (PDW)

DESCRIPTION:

The 9mm PDW is a semi-automatic, magazine fed, essentially commercial handgun. It is intended to fire the standard NATO 9mm ammunition and have a higher probability of hit, improved safety, and better RAM than the standard M1911A1 pistol.

LEAD SERVICE: Army

PARTICIPATING: Air Force, Navy Marine Corps

JOINT DETAILS:

The Air Force had the original requirement for a new handgun and Congress directed that a joint program be undertaken to develop a new handgun which would meet NATO RSI requirements. The 9mm was selected and the Army was made lead Service for the program as the biggest user. The weapon is to be an "off-the-shelf" acquisition. There are difficulties finding a commercially available weapon which meets all Service requirements. A contract is to be let in FY84 for six prototypes for extensive testing and, hopefully, a selection of the winner.

# APPENDIX B
## DISTRIBUTION OF PROGRAM CHARACTERISTICS

## DISTRIBUTION OF PROGRAM CHARACTERISTICS

The Joint Program Study attempted to include joint programs with a variety of different characteristics. This section addresses the range and depth of information on joint programs and discusses the distribution across the data base of the following seven program attributes:

- Current Acquisition Phase
- Major vs. Non-Major Systems
- System Type
- Organizational Type
- Phase When Made Joint
- Organization Directing Jointness
- Lead Service.

### B.1 CURRENT ACQUISITION PHASE

Current acquisition phase was an important determinant of the amount of data available on each program. The earlier a program was in the acquisition cycle, the less likely it was that full information was available to calculate all desired statistical ratios. Figure B.1-1 shows the current acquisition phase (as of December 1983) for each of the 83 programs in the data base. The numbers in this figure refer to the numbered programs in Table 2.3-1. This figure demonstrates that the study captured a sampling of programs in all phases of the acquisition process.

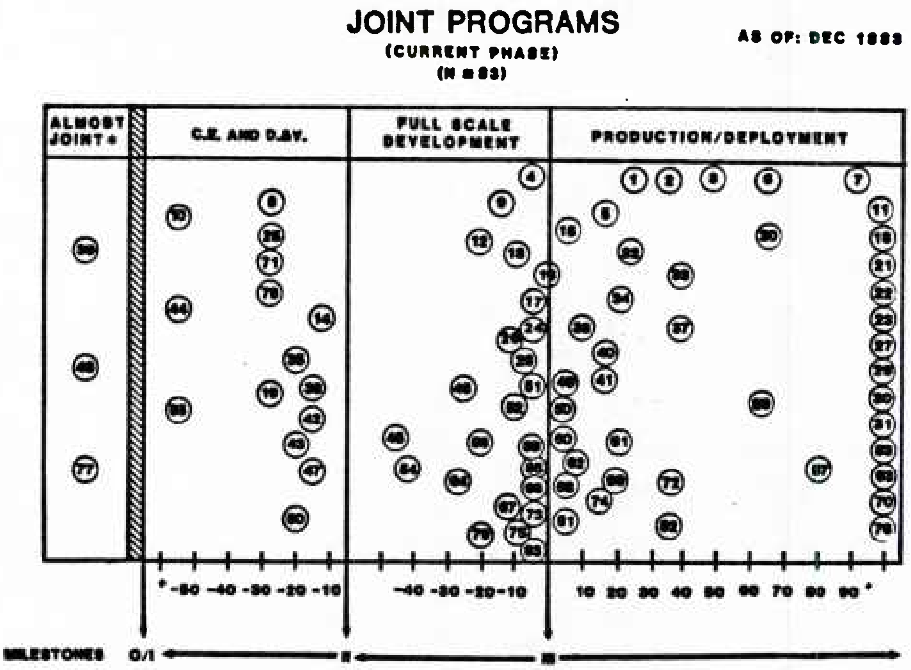


Figure B.1-1 Current Acquisition Phase of Joint Programs

Figure B.1-2 shows an alternative depiction of the current acquisition phase of all 83 programs.

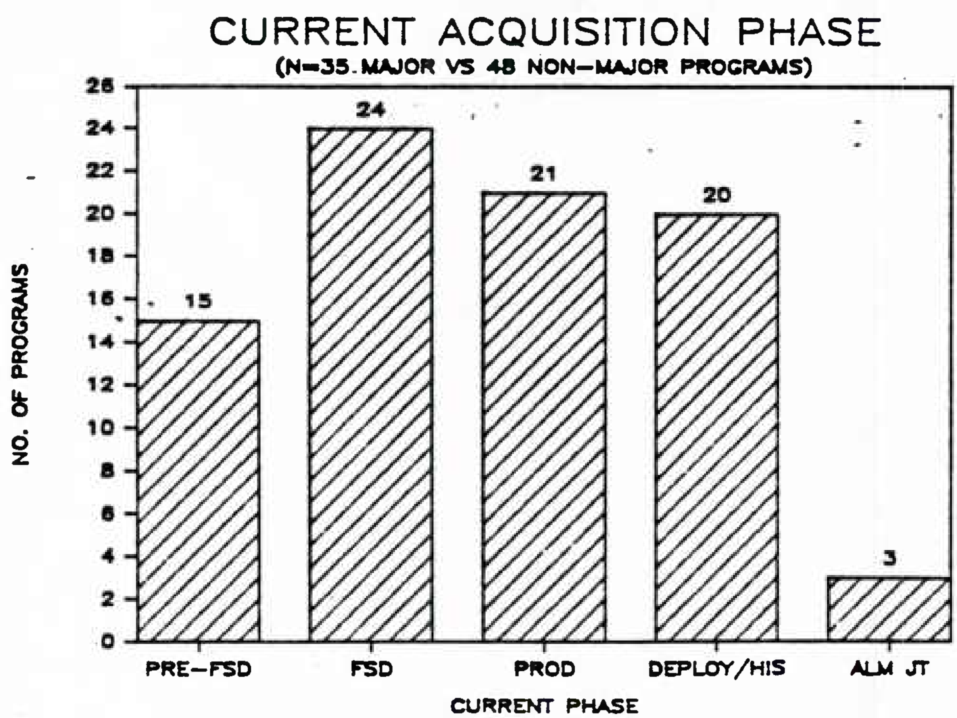


Figure B.1-2 Current Acquisition Phase of Joint Programs in Study

Figure B.1-3 compares the distribution of the current acquisition phase of major programs with that of non-major programs.

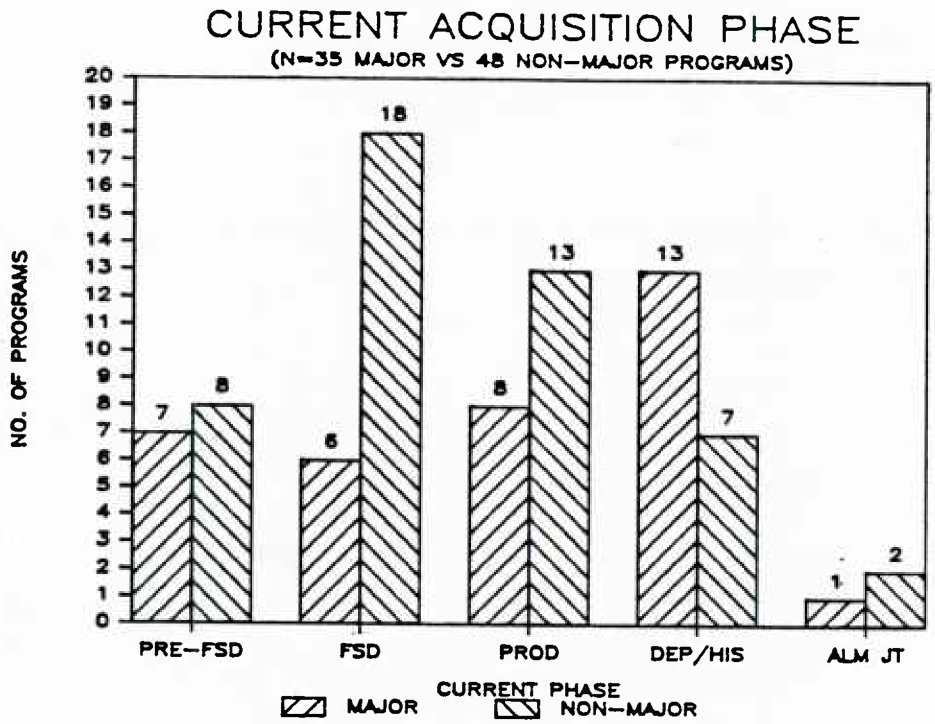


Figure B.1-3 Current Acquisition Phase of Major vs. Non-Major Joint Programs

## B.2 MAJOR AND NON-MAJOR SYSTEMS

For the purpose of analysis, programs in the study were often divided into major and non-major systems. There are 48 non-major systems in the data base and 35 major systems.

For a system to be considered major, it had to meet one of the four following criteria:

- A SAR program (e.g., STINGER)
- Of significant interest to Congress, OSD (e.g., JTACMS)
- A full system with more than $200 million in R&D (e.g., MILSTAR)
- A full system with more than $1 billion in production (e.g., AIM-7).

Non-major programs were defined according to one of the four following criteria:

- A full system that does not meet the criteria of a major system
- A constituent element of a major or non-major system that performs a major function of a complete system (e.g., gas turbine engine)
- A subsystem that can be adpated to a full system for which it was not developed, but at some cost (e.g., HH-60 SIM)
- A technology program that will advance the state-of-the-art in a specific technical discipline or adapt a new technology to a military mission <u>without</u> necessarily advancing beyond the prototype or pre-prototype state (e.g., VHSIC).

## B.3 SYSTEM TYPE

The 83 programs in the data base fall into the eleven system types listed in Table B.3-1. The number of programs in each category is depicted in Figure B.3-1.

TABLE B.3-1

SYSTEM TYPES

1. Component/Subsystem (e.g., BISS)
2. $C^3$Nav/I (e.g., JTIDS)
3. Missiles (e.g., ALCM)
4. Aircraft (e.g., F-111)
5. Ground Combat Vehicles (e.g., MPGS)
6. Munitions (e.g., LLLGB)
7. Ground Combat Support (e.g., CFFS)
8. Space (e.g., DSCS)
9. Technology (e.g., ASMS)
10. Hand Weapons (e.g., 9mm Handgun)
11. Ships (e.g. TAKR)

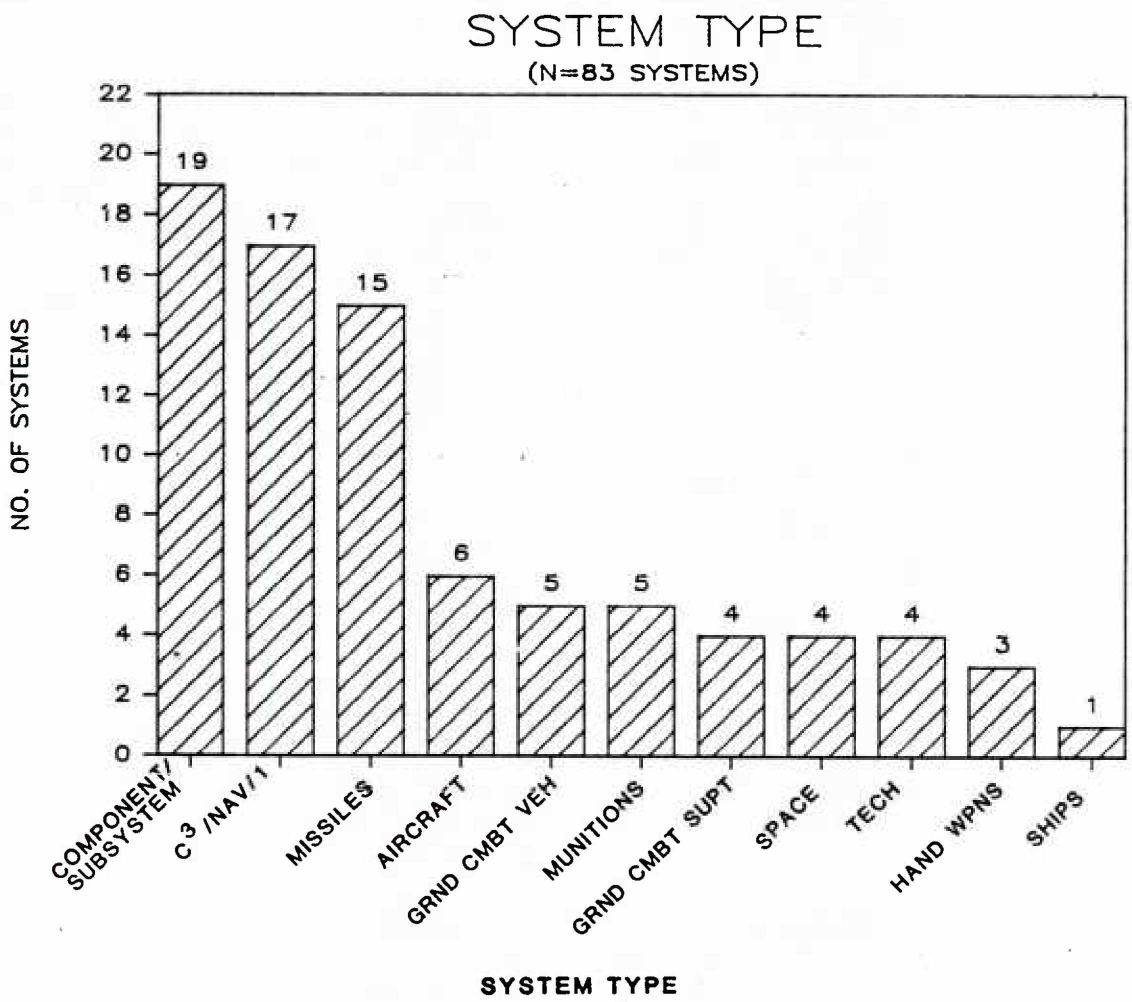


Figure B.3-1 System Type of Joint Programs

## B.4 ORGANIZATIONAL TYPE

The organizational structures of the 80 joint programs fall into the five categories listed below:

- <u>Single Service Program/Coordination with Participating Service(s) - (SS/C)</u>

  Programs managed by a single service, but formally coordinated with other interested services. Although there may be some task sharing and joint funding of specific parts of the program, there is no formal commitment by the other services to procure or use the system (e.g., BISS)

- <u>Single Service Program/Commitment from Participating Service(s) - (SS/Com)</u>

  Programs managed by a single service, but with a prior commitment from another service to procure or utilize the final system (e.g., FIREBOLT)

- <u>Fully Integrated Joint Program Office - (JPO)</u>

  Programs staffed by all participating services and directed by a program manager assigned by the lead service. The lead service is designated the executive agent by a coordinating memorandum of agreement, charter, or Joint Operational Procedures (JPOs) with the other participating services. The executive agent uses its own procedures to implement the program, but participating services may perform some functions directed by the JPO (e.g., ASPJ)

- <u>Confederate/Independent - (CONF)</u>

  Independent, but similar programs ongoing in two or more services with planned coordination and some task and technology sharing. This is to minimize making similar mistakes or duplicating

efforts, while maintaining separate character, direction, and funding (e.g., HH-60)

- <u>OSD Managed (OSD)</u>

  More than one service involved with a program, but no lead service. No day-to-day coordination or direction by a program manager. The entire system is executed directly by OSD or a project office established by OSD (e.g., VHSIC).

Figure B.4-1 shows the distribution of programs by organizational type. Figure B.4-2 compares the distribution of the organizational type of major systems with that of non-major systems.

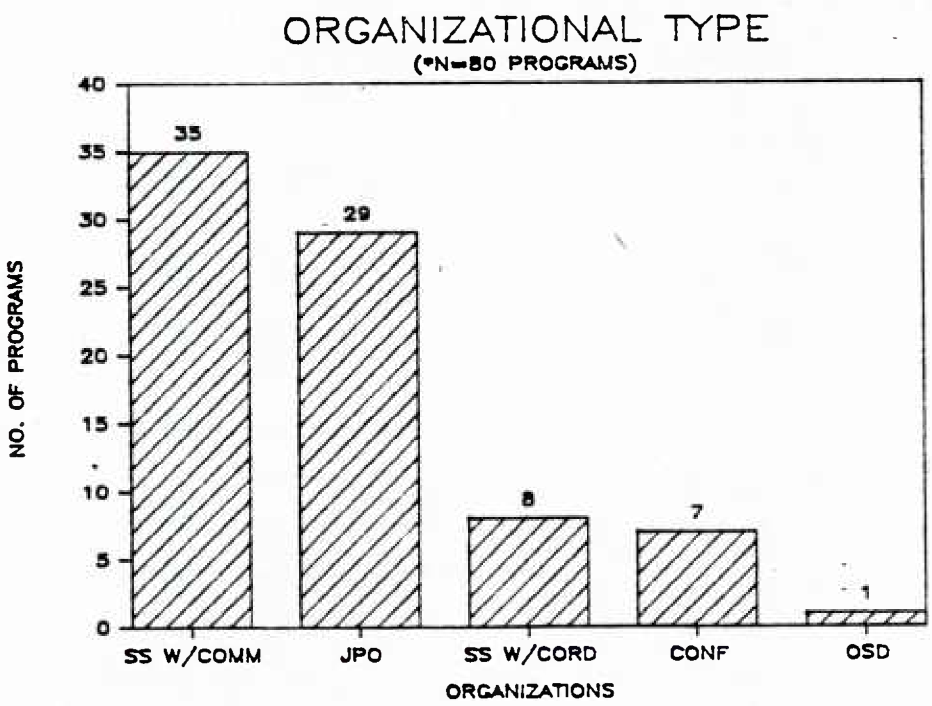


Figure B.4-1 Organizational Type of Joint Programs

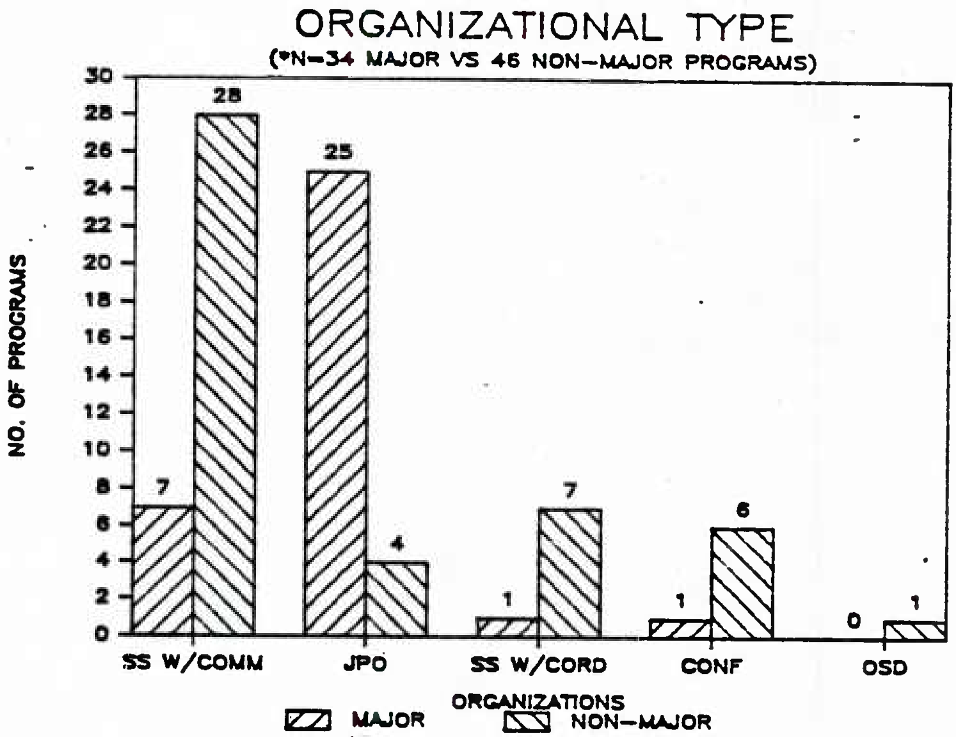


Figure B.4-2 Organizational Type of Joint Programs for Major and Non-Major Systems

## B.5 PHASE WHEN MADE JOINT

Programs in the data base can also be segmented by the acquisition phase they were in when they became joint. It was important to distinguish between those programs that were joint from the outset and those that became joint later on during development or production. Recent studies by the GAO and the DSB have suggested that programs that go joint early on have a greater likelihood of success. The Joint Program Study addressed this assertion by comparing success ratings of those programs that went joint initially with those that became joint later in the acquisition cycle.

Of the joint programs in the data base, 52 (65 percent) were joint at the start of pre-FSD, 19 (24 percent) went joint during FSD, and 9 (11 percent) became joint during production or deployment. The three almost joint programs (F-46, HH-60SIM, LAB) are, by definition, not included in this breakdown.

Figure B.5-1 shows the 80 joint programs in the acquisition phase they were in when they went joint. Figure B.5-2 compares the distribution of the phase when joint category for major and non-major systems. Of the major programs, 21 (62 percent) went joint in pre-FSD, 8 (25 percent) in FSD, and 4 (13 percent) during production and deployment. The majority of non-major systems also went joint early on. Thirty-one (67 percent) went joint in pre-FSD, 11 (24 percent) in FSD, and the remaining 5 (9 percent) during production or deployment.

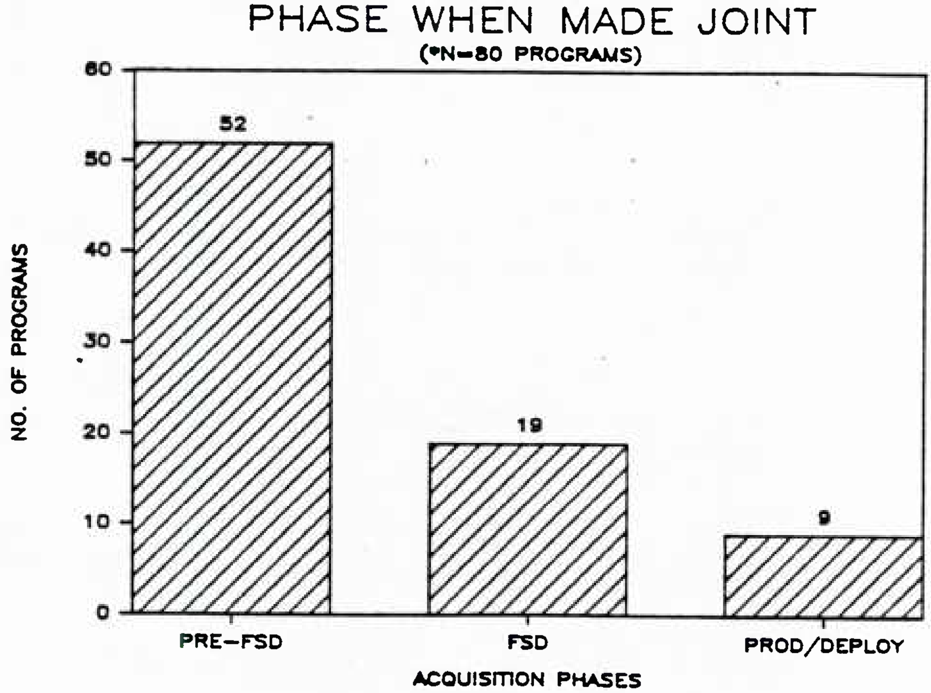


Figure B.5-1 Phase When Made Joint for Joint Programs

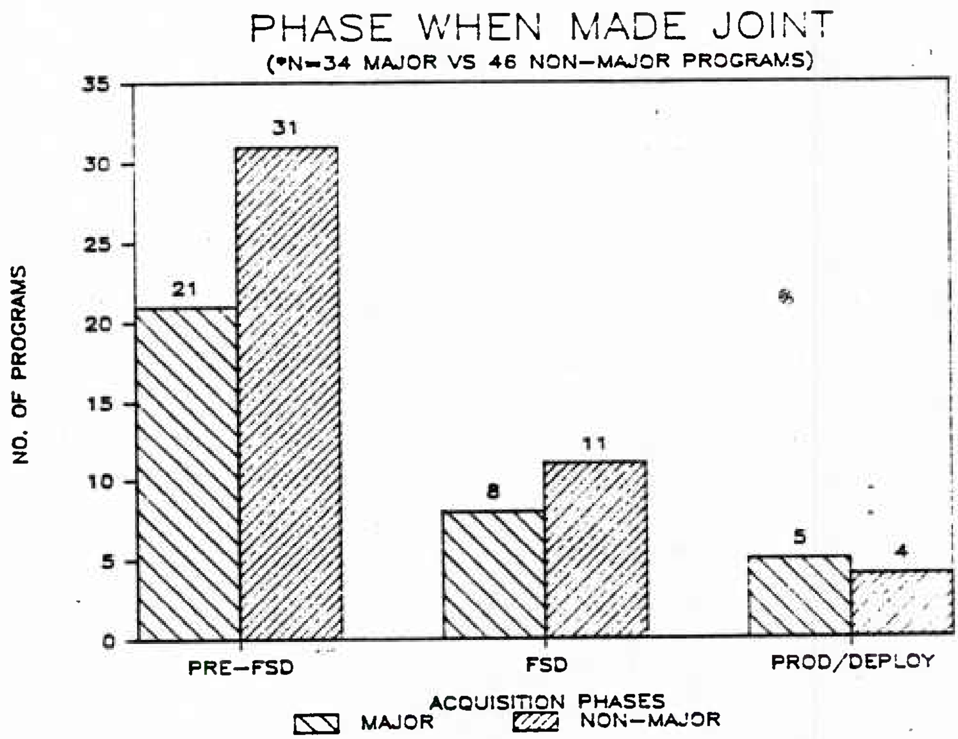


Figure B.5-2 Phase When Made Joint for Major and Non-Major Systems

## B.6 ORGANIZATION DIRECTING JOINTNESS

The joint program management study collected information as to whether a joint program was established by OSD or Congress (externally) or by an organization within the Services (internally). Prior studies, in particular the GAO report, indicate that most joint programs are established by OSD. These studies, however, are based primarily on major systems. This study assesses the organizations responsible

for directing that a program be joint for both major and non-major systems and then correlates this information with how well a program is executed.

Determining the organization that established the joint program was somewhat difficult. Congressional interest in a program often prompted OSD to take the lead in establishing a program as joint. Congressional and OSD directions are, therefore, combined into one category of external direction. In cases where internal service actions led to a joint program, but an OSD directive was required to actually initiate the program, origination was credited to the services. Table B.6-1 shows examples of internal and external establishment of joint programs.

TABLE B.6-1

ORGANIZATION DIRECTING JOINTNESS

| Internal | External |
|---|---|
| JCS (WIS) | Congress (Copperhead) |
| Services (Cobra Judy) | OSD (Biss) |
| JLC (MATE) | |

Of the 80 programs, 50 were established by external sources and 30 by sources internal to the services. Figure B.6-1 compares this distribution for major and non-major systems. Of the 34 major systems, 24 (73 percent) were established by external organizations and 9 (27 percent) by internal organizations. For the 46 non-major systems, 26 (55 percent) were externally established and 21 (45 percent) were internally established.

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TABLE B.7-1

LEAD SERVICE FOR 76 JOINT PROGRAMS

**AF LEAD SERVICE**
N = 30

| | | |
|---|---|---|
| AMRAAM | EMDP | LASER MAVERICK |
| APG-68 | FIREBOLT | LLLGB |
| ASMS | F-100 ENG | MILSTAR |
| BILL | F-111 | MSER |
| CHEM/BIO | GATOR | PACER SPEAK |
| CNCE | GPS | SCADC |
| COBRA JUDY | HH-60D | SFDR |
| COMBAT ID | IR MAVERICK | SID SIM DATA BASE |
| DMSP | JSTARS | TIPI |
| DSCS | JTIDS | WIS |

**ARMY LEAD SERVICE**
N = 27

| | | |
|---|---|---|
| AN/AVS-6 | JTACMS | SCOTT |
| AN/TSC-94A | JTF | SAW |
| ATM | LAV | STINGER |
| CFFS | MEP | TAC SHELTER |
| COPPERHEAD | MPGS | TEMPER TENT |
| DRAMA RADIO | MSCS | VOLCANO |
| DSCS G5 | M-198 | 40mm Ammo |
| HELLFIRE | PLRS | 5-TON TRUCK |
| HMMWV | ROWPU | 9mm HAND GUN |

**NAVY LEAD SERVICE**
N = 15

| | | |
|---|---|---|
| AIM-7M | FLATSATCOM | JVX |
| AIM-9M | FMU-139 | OBOGS |
| ASPJ | F-4B/F-4C | SAHRS |
| A-7D | GUAYULE | STD ARM |
| BIGEYE | HARM | TAKR |

**JCMPO** (Navy Lead)
N = 4

| | |
|---|---|
| ALCM | MRASM |
| GLCM | SLCM |

The services involved in a joint service program must operate in accordance with DoD 5000.1. Under this directive, "The service designated as the executive agent (or lead) shall have the authority to manage the program under the policies and procedures used by that service." There is, however, no established policy for selecting this lead service. Some of the reasons for designating one service the lead are listed below:

- Significant prior efforts leading to technical capability
- Pressing need for the system on the part of one service
- OSD direction for one service to be the executive agent in a specific area (e.g., Army is the executive agent for tactical shelters)
- Ongoing eforts on the part of one service.

For major systems, USDR&E typically designates a lead service and directs it to charter a joint program. For non-major systems, the lead service may be determined at a lower level.

# APPENDIX C

## FACTOR DESCRIPTIONS

1. ACQUISITION STRATEGY. Defined as the conceptual basis for all planning to accomplish specified goals and objectives to attain a mature and logistically supportable weapon system or equipment. Acquisition strategy was quantified on a ten point scale ranging from 1 to 3 points for an inadequate strategy, 4 to 7 for adequate, and 8 to 10 for excellent. The points were assigned subjectively based on a composite measure of two subfactors: strategy development and strategy execution. Strategy development was evaluated against three points: timeliness of the development; inclusion of provisions to deal with risk reduction, competition, requirements change, producibility, and production scheduling; and joint agreement on the strategy. Strategy execution was a subjective evaluation of how successful the strategy was in meeting program objectives.

2. BASIS FOR LEAD SELECTION. The rationale used in selecting the lead, or executive, Service. Categories include: most pressing need; largest quantity buy; previously designated lead Service for type of system; technical capability; previous agreement; or other.

3. CHARTER EFFECTIVENESS. Subjective evaluation of the program managers charter using a ten point scale. Low effectiveness was graded in the 1 to 3 point range, medium in the 4 to 7 point range, and high between 8 to 10 points. The point values were determined from an assessment of five key points: existence of a charter; need for the charter; joint preparation and approval of the charter; timing of the charter; and inclusion of the minimum elements for a charter as proscribed by the JLC handbook.

4. CHARTER EXISTENCE. Scored as a "one" if the PM had a signed charter. Scored as a "zero" if there was no charter or only a draft charter.

5. CHARTER NEED. Subjective assessment of the Program Manager as to whether or not the charter was needed to execute the program. Scored as a "one" for yes and a "zero" for no.

6. COMMONALITY PERCENTAGE. The amount of dollars spent for common equipment and efforts in both R&D and production, divided by the total program dollars for R&D and production.

7. COMMONALITY OF SPECIFICATIONS. Subjective assessment of the degree of commonality of specifications. Based on program office approximations of the percentage of

system, subsystem, component, process, and other specifications that were common. Scored on a ten point scale with 8 to 10 points for very similar specifications, 4 to 7 points for moderately similar, and 1 to 3 points for dissimilar specifications.

8. CONFIGURATION STABILITY INDEX. Subjective measure of the Service-peculiar Class I changes in a joint program. Scored on a ten point scale with many changes scored in the 1-to-3 point range, an average number of changes in the 4-to-7, and few changes in the 8-to-10 point range.

9. COST BENEFIT ANALYSIS. Determination of whether or not a study was made to evaluate the total program cost of the joint program against the total cost of separate single Service alternatives. Scored as a "one" if the analysis was performed and a "zero" if it was not.

10. COST ESTIMATING PROBLEMS. The existence of any interservice disputes on program cost as a result of separate Service cost estimates. Scored as a "one" if problems existed and a "zero" if there were no problems or if no separate cost analysis was ever done.

11. COST SHARING AGREEMENT. The level of the agreement between the Services on how program costs will be shared. If the agreement is formalized it is scored as a "one." If the agreement is informal then it is scored as a "two."

12. COST SHARING AGREEMENT HELPED. Subjective assessment by program office personnel on whether or not the cost sharing agreement helped in the program execution. Scored as a "one" for yes and a "zero" for no.

13. COST SHARING PROBLEMS. Determination by program office personnel as to whether or not there had been any interservice disagreements on who was to pay for what. Scored as a "one" for yes and "zero" for no.

14. COST SHARING STABILITY. Subjective assessment of the Services' commitment to develop and maintain an agreement to share program costs. Scored on a ten point scale with high stability scored in the 8-to-10 point range, moderate in the 4-to-7 point range, and low in the 1-to-3 point range.

15. CURRENT PHASE. The acquisition phase the joint program was in at the time of the program review. Programs were divided into eight categories: concept evaluation; demonstration and validation; full scale development; production; deployed; historical (program office disestablished); almost joint, no interest in making this a joint program; and almost joint, still pending a final decision.

16. DESIGNATION OF LEAD SERVICE. The organization that selected the lead Service for the joint program. Categories include: Congress, OSD, agreement within the Service, JLC, and other.

17. DOCUMENTED NEED, LEAD. The existence of a validated requirement for the program within the lead Service. Scored as a "one" for yes and a "zero" for no.

18. DOCUMENTED NEED, PARTICIPATING SERVICE B. Same as above, only for participating Service.

19. DOCUMENTED NEED, PARTICIPATING SERVICE C. Same as above, only for other participating Service (if any).

20. EXTERNAL FUNDING SUPPORT. Subjective assessment of the support for the program outside the Services (i.e., OSD, Congress, etc.). Scored on a 1-to-10 scale with full support scored from 8 to 10, average from 4 to 7, and low from 1 to 3. The assessment was based upon the frequency and magnitude of funding disruptions.

21. FUNDING COMMITMENT, LEAD. Subjective assessment of the lead Service's commitment to the joint program. Formed as a composite measure of cost sharing agreement, cost sharing stability, and funding support. Scored on a 1-to-10 scale with 10 points signifying strong support and 1 point signififying weak support.

22. FUNDING COMMITMENT, PARTICIPATING SERVICE B. Same as above for participating Service.

23. FUNDING COMMITMENT, PARTICIPATING SERVICE C. Same as above for second participating Service (if any).

24. FUNDING INTERNAL SUPPORT, LEAD. Subjective measure of the funding support of the joint program within the lead Service. Scored on a 1-to-10 scale with full support in the 8-to-10 point range, average between 4 to 7, and low support the 1-to-3 point range. Measurement is based on the magnitude and frequency of R&D funding cuts on reprogramming actions and production quantity changes.

25. <u>FUNDING INTERNAL SUPPORT, PARTICIPATING SERVICE B</u>. Same as above for participating Service.

26. <u>FUNDING INTERNAL SUPPORT, PARTICIPATING SERVICE C</u>. Same as above for the other participating Service (if any).

27. <u>FUNDING TURBULENCE</u>. An absolute measure in terms of cumulative percentage of how far the program funding had strayed from its original plan. It is calculated from the sum of the actual dollars minus the planned dollars divided by the sum of the planned dollars.

28. <u>INTEGRATED PLAN EXECUTION</u>. Subjective measure of the effectiveness in executing an integrated plan for the joint program. Effectiveness is scored on a 1-to-10 scale with 10 reflecting an effective execution and 1 reflecting ineffectiveness. The key element used in determining the score was schedule delays that were due specifically to the joint nature of the program.

29. <u>INTERSERVICE AGREEMENT</u>. Subjective measurement of the effectiveness of the interservice agreements governing the joint program. A 1-to-10 scale was used with high effectiveness scored in the 8-to-10 range, medium in the 4-to-7 range, and low effectiveness scored in the 1-to-3 range. Elements used in the determination of the score were: level of the negotiation and agreement; contribution to program success; and timeliness of the agreement.

30. <u>MAJOR SYSTEM</u>. A program that met at least one of the following criteria: SAR program, significant interest level in Congress or OSD, a full system with R&D costs that excede $200 million, or a full system with production costs that excede one billion dollars. Major systems were scored as a "one" and all others were scored as a "zero."

31. <u>MANNING LEVEL, LEAD</u>. Subjective assessment of the manning levels assigned to the program office by the lead Service. A 1-to-10 scale was used with high manning rated 8 to 10, medium 4 to 7, and low 1 to 3. The score was derived from a combination of the ratio of personnel assgined-to-authorized and other factors such as lengthy vacancies, PM turn-over rates, and adequacy of authorizations.

32. <u>MANNING LEVEL, PARTICIPATING SERVICE B</u>. Same as above for the participating Service.

33. <u>MANNING LEVEL, PARTICIPATING SERVICE C</u>. Same as above for the other participating Service (if any).

34. MEMORANDUM OF AGREEMENT. The existence of a formal inter-service agreement covering the joint program. Scored as a "one" if a MOA existed or a "zero" if there was no MOA.

35. NEGOTIATION LEVEL. The highest level at which the basic interservice agreement was negotiated. Categories include: Service Secretary, Service Headquarters, the JLC, Product Division, or other.

36. ORGANIZATION DIRECTING JOINTNESS. The organization that specifically took action to make the program a joint effort. Categories include: Congress, OSD, JCS, Services, JLC, or other.

37. ORGANIZATIONAL APPROPRIATENESS. Subjective assessment of the appropriateness of the organization of the joint program office. Scored on a 1-to-10 scale with high appropriateness rated 8 to 10, average from 4 to 7, and low from 1 to 3. The score was derived from the program manager's assessment of the appropriateness of the organizational type and the degree of participation in program management by the participating Services.

38. ORGANIZATIONAL EFFECTIVENESS. Subjective assessment of the way the program office is organized, staffed, and managed. Formed as a composite score from Organization Type, Organizational Appropriateness, and Manning Levels. Scored on a ten point scale with high being rated between 8 to 10, medium 4 to 7, and low 1 to 3.

39. ORGANIZATIONAL TYPE. Type of program office organization used to manage the program. Data was collected using the definitions of joint program types as found in the JLC handbook. Later these types were grouped into more convenient definitions. These definitions are: Joint Program Office (JPO), Confederated Programs, OSD-managed, Single Service-managed with other Service commitment, and Single Service-managed with other Service coordination.

40. PRIOR EFFORT, LEAD SERVICE. Quantification of those efforts in the lead Service that preceded the joint program. Scored on a 1-to-10 scale with point values assigned to: Ongoing Existence (0 for no program, 4 for a favorable program, or 2 for an unfavorable); Documented Need (0 for none and 2 for yes); point in acquisition cycle (1 for pre-FSD and 2 for FSD and beyond); and Service Priority (0 for bottom one-third, 1 for middle one-third, and 2 for top one-third).

41. PRIOR EFFORT, PARTICIPATING SERVICE B. Same as above for the efforts in the participating Service.

42. PRIOR EFFORT, PARTICIPATING SERVICE C. Same as above for the efforts in the other participating Service (if any).

43. PRIORITY OF NEED, LEAD. An approximation of where the lead Service would have placed the need for this system (or equipment) relative to all other Service needs. Scored on a three point scale. If the need was assessed to be in the top one-third of all needs it was given one point; if it was in the middle one-third it was given two points; and if it was in the lowest third it was given three points.

44. PRIORITY OF NEED, PARTICIPATING SERVICE B. Same as above for the participating Service.

45. PRIORITY OF NEED, PARTICIPATING SERVICE C. Same as above for the other participating Service (if any).

46. PRE-JOINT ENVIRONMENT INDICATOR. An assessment of the environment in the Services prior to the existence of the joint program. This factor is a composite of Prior Efforts, Technical Requirements Similarity Index, Timeliness Similarity Index, and Roles and Mission Differences. The net effect of these elements are subjectively evaluated and scored on a 1-to-10 scale with a favorable environment scored in the 8-to-10 point range, a neutral environment between 4 to 7, and an unfavorable environment scored from 1 to 3 points.

47. PROGRAM MANAGER AUTHORITY. Subjective assessment of the program manager's authority to execute the joint program. This factor is a composite of Charter Effectiveness and Program Manager's Limitations. Scored on a 1-to-10 scale with full authority between 8 to 10 points, average between 4 to 7, and very limited authority between 1 to 3 points.

48. PROGRAM MANAGER LIMITATIONS. A numerical average of the scores given by the program manager when asked to assess his authority to: make trade-offs; identify funding needs and control funds; manage configuration control; communicate with other Services; and manage office personnel. Program managers rated each function on a 1-to-10 scale with 10 points representing "highly adequate" and 1 point representing "low."

49. POINT IN ACQUISITION CYCLE, LEAD. The furthest point in the acquisition cycle that the lead Service had progressed to with any prior effort that preceded the joint program. Categories included: not started; concept

exploration; demonstration and validation; full scale development; and production.

50. POINT IN ACQUISITION CYCLE, PARTICIPATING SERVICE B. Same as above for participating Service.

51. POINT IN ACQUISITION CYCLE, PARTICIPATING SERVICE C. Same as above for other participating Service (if any).

52. RATIONALE INDEX. The principal reason given for the decision to form a joint program. Responses were limited to: cost savings; interoperability; interoperability as well as cost savings; and other.

53. ROLES AND MISSIONS DIFFERENCE. Assessment by program office personnel as to whether or not the joint program created any changes in the basic roles and missions of the Services. If a change occurred it was scored as a "one" and if there was no change it was scored as a "zero."

54. SINGLE SERVICE FUNDING. When one Service pays for all R&D costs except for any single Service peculiar items. Scored as a "one" for yes and a "zero" for no.

55. SERVICE ENTHUSIASM, LEAD. Subjective assessment of the enthusiasm of the lead Service for the joint program at its inception. High enthusiasm is rated between 8 to 10, average between 4 to 7, and low enthusiasm between 1 to 3 points.

56. SERVICE ENTHUSIASM, PARTICIPATING SERVICE B. Same as above for the participating Service.

57. SERVICE ENTHUSIASM, PARTICIPATING SERVICE C. Same as above for the other participating Service (if any).

58. SOURCE OF JOINTNESS. Determination of whether the activity that determined whether the program was to be joint was internal to the Service structure (Service staffs, JLC, JCS, etc.) or external (OSD, Congress, OMB, etc.). Internal was scored as a "zero" and external as a "one."

59. TECHNICAL COMPLEXITY. Approximation, in relative terms, of the technical complexity of the final product of the program. The relative nature of the complexity is considered by evaluating the product compared to other products in the same class (aircraft, missiles, radios, etc.). Five separate elements were assessed and scored on a 1-to-10 scale and then averaged for an over-all

score. The five elements were: number of subsystems and components; degree of interface complexity; difficulty in mission integration; maturity of the technology; and impact of technology on achieving desired performance goals. A score of 10 indicates a highly complex system and a score of 1 indicates low technical complexity.

60. <u>TECHNICAL REQUIREMENTS COMPROMISE INDEX, LEAD</u>. Subjective assessment of the amount of compromise that the lead Service was required to make in its original technical requirements. Measured on a five point scale with each point defined as follows:

    1. Significant differences which cannot be resolved through compromise

    2. Significant differences which required major compromise

    3. Significant differences with minor compromise required

    4. Significant differences satisfactorily resolved with no compromise

    5. No significant requirements differences.

61. <u>TECHNICAL REQUIREMENTS COMPROMISE INDEX, PARTICIPATING SERVICE B</u>. Same as above for the participating Service.

62. <u>TECHNICAL REQUIREMENTS COMPROMISE INDEX, PARTICIPATING SERVICE C</u>. Same as above for the other participating Service (if any).

63. <u>TECHNICAL REQUIREMENTS RESOLUTION, INITIAL</u>. Subjective assessment of the overall compromise required between the Services when the program was first established. Measured on the same five point scale as TECHNICAL REQUIREMENTS COMPROMISE.

64. <u>TECHNICAL REQUIREMENTS RESOLUTION, CURRENT</u>. Same as above, but reflecting any changes that may have occurred since the program was established.

65. <u>TECHNICAL REQUIREMENTS SIMILARITY INDEX</u>. A quantification of the similarity in the requirements of the Services at the establishment of the joint program. The index is calculated from the top five or six key requirements (technical performance requirements). Each of the requirements is weighted by relative importance as a percentage of the whole. For example, if there were five

key requirements, each equally important, then they would each be weighted as 0.20 (20 percent). The similarity of the weighted requirements are then calculated as a ratio of the participating Service requirements to the lead Service requirements. When the parameters are not quantified, such as a requirement for compatibility with another system or device, the requirements are shown as a "one" for compatibility and a "zero" for compatibility not required.

66. TIMELINESS COMPROMISE INDEX, LEAD. The difference ( in years) between the original lead Service specified IOC date and the joint program IOC date.

67. TIMELINESS COMPROMISE INDEX, PARTICIPATING SERVICE B. Same as above for the participating Service's original IOC date.

68. TIMELINESS COMPROMISE INDEX, PARTICIPATING SERVICE C. Same as above for the second participating Service (if any) original IOC date.

69. TIMELINESS SIMILARITY INDEX. The difference in years of the IOC dates for each of the Service's programs.

70. WHEN JOINT PROGRAM PHASE. The acquisition phase in which the joint program was formed. Categories include: concept exploration; development and validation; full scale development; production; and deployed.

# APPENDIX D
# DATA ANNEX

# DATA ANNEX

In the course of analyzing the programs in the study a large amount of quantitative information was generated. It was neither possible nor practical to include all of this information in the body of the main report. This apppendix, therefore, contains the data and information that was generated throughout the study, but which was too detailed for or not directly applicable to the main report and briefing.

Section D.1 presents a summary of the statistical analyses of factor/success relationships.

The subsequent sections present detailed findings, broken down by five major program attributes:

- Major versus non-major systems
- Organization
- System type
- Organization directing jointness
- Acquisition phase.

Each program attribute section presents histograms, data matrices, and regression scatter plots of findings. Each section also displays information on the 118 variables or "factors" looked at by the study. These factors are grouped into four categories:

- Pre-joint factors
- Selection and initiation factors
- Execution factors
- Success factors.

## D.1 FACTOR/SUCCESS RELATIONSHIPS

A number of statistical techniques were employed to analyze the relationship between various factors and program success measures. These techniques included fairly simple analyses, such as the comparison of sample means and more complex analyses, such as correlation and regression of factor and success measures.

<u>Quartiles</u> - Success ratings were computed for the 80 Joint Programs. These ratings were then separated into quartiles for the individual success measures. Table D.1-1 lists the total number of programs with ratings and the number of programs in the first and fourth quartiles.

TABLE D.1-1

SUCCESS RATINGS FOR MAJOR AND NON-MAJOR PROGRAMS

| MAJOR PROGRAMS | | NON-MAJOR PROGRAMS |
|---|---|---|
| 34 | Initiation Success | 46 |
| 8 | First Quartile | 11 |
| 8 | Fourth Quartile | 11 |
| | | |
| 26 | Execution Success | 32 |
| 6 | First Quartile | 12 |
| 7 | Fourth Quartile | 8 |

The average value for the first and fourth quartile of each factor was used to derive an average percentile rating for that quartile. A comparison was then made between the percentiles in the first quartile and those in the fourth quartile. The presence of a major difference between the top and bottom quartiles indicated that further analysis was warranted. Table D.1-2 presents the first and fourth quartile average and the percentile data for major and non-major initiation and execution success ratings. Where no percentile is shown the sample size was too small or the factor did not lend itself to a percentile calculation, i.e., the documented need factors were yes or no answers.

## TABLE D.1-2

## COMPARISON OF FACTOR VALUES

| MAJOR FACTOR | INITIATION SUCCESS | | | | EXECUTION SUCCESS | | | |
|---|---|---|---|---|---|---|---|---|
| | TOP QUARTILE | | BOTTOM QUARTILE | | TOP QUARTILE | | BOTTOM QUARTILE | |
| | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE |
| **Pre-Joint Environment** | | | | | | | | |
| Pre-Joint Environment | 8.33 | 80 | 4.60 | 27 | 8.00 | 71 | 5.20 | 30 |
| Prior Effort, Lead | 9.00 | 76 | 6.75 | 46 | 8.50 | 65 | 6.50 | 38 |
| Prior Effort, Service B | 7.00 | 61 | 6.75 | 57 | 6.67 | 56 | 5.00 | 36 |
| Prior Effort, Service C | 0 | | 2.50 | | 2.00 | 36 | 1.00 | 28 |
| Point In Acquisition Cycle, Lead | 3.29 | | 1.14 | | 1.67 | | 2.00 | |
| Point In Acquisition Cycle, Service B | 2.50 | | 1.57 | | 1.00 | | 1.40 | |
| Point In Acquisition Cycle, Service C | 0 | | 0 | | 0 | | 0 | |
| Documented Need, Lead | 1.00 | | 0.75 | | 0.83 | | 1.00 | |
| Documented Need, Service B | 0.86 | | 0.75 | | 1.00 | | 0.60 | |
| Documented Need, Service C | 0 | | 0 | | 0.50 | | 0 | |
| Priority of Need, Lead | 1.29 | | 1.86 | | 1.17 | | 2.33 | |
| Priority of Need, Service B | 1.33 | | 2.17 | | 1.83 | | 2.60 | |
| Priority of Need, Service C | | | 3.0 | | 1.00 | | 3.00 | |
| **Selection and Initiation** | | | | | | | | |
| Technical Requirements Similarity Index | 0.95 | 81 | 0.52 | 21 | 0.89 | 72 | 0.60 | 27 |
| Timeliness Similarity Index | 0.43 | | 2.0 | | 0.83 | | 1.50 | |
| Roles and Missions Differences | 0 | | .38 | | 0 | | 0 | |
| Source of Jointness | 0.38 | 64 | 1.00 | | | | | |
| Rationale Index | 1.75 | | 2.00 | | 1.83 | | 2.83 | |
| Basis for Lead Selection | 3.75 | | 3.75 | | 2.33 | | 4.00 | |
| Designation of Lead | 2.50 | | 2.00 | | 2.17 | | 2.17 | |
| Inter-Service Agreement | 7.71 | 58 | 5.50 | 29 | 7.17 | 43 | 7.33 | 46 |
| Negotiation Level | 2.29 | | 2.14 | | 2.67 | | 3.17 | |
| Memorandum of Agreement | 0.86 | | 0.88 | | 0.67 | | 1.0 | |
| Technical Requirements Compromise, Lead | 4.83 | | 2.17 | | 3.77 | | 3.50 | |
| Technical Requirements Compromise, Service B | 4.67 | | 0.83 | | 4.17 | | 2.60 | |
| Technical Requirements Compromise, Service C | 4.00 | | 3.00 | | 0 | | 0 | |
| Timeliness Compromise, Lead | 0.13 | 1/8YR | 0.33 | 1/3YR | 0 | | 0 | |
| Timeliness Compromise, Service B | 0.14 | 1/6YR | 0.80 | 4/5YR | 1.0 | | 0 | |
| Commonality Percentage | 0.97 | 82 | 0.79 | 36 | 0.86 | 45 | 0.65 | 29 |
| Cost Sharing Agreement | 1.43 | | 1.29 | | 1.17 | | 1.33 | |
| Cost Benefit Analysis | 0.14 | 14 | 0.13 | 13 | 0.17 | 17 | 0 | |
| Charter Existence | 0.71 | 71 | 0.25 | 25 | 0.50 | 50 | 0.67 | 67 |
| Technical Complexity | 6.71 | 44 | 8.00 | 78 | 6.33 | 41 | 7.33 | 57 |
| Commonality of Specifications | 8.86 | 85 | 4.60 | 30 | 8.67 | 79 | 7.17 | 38 |
| Technical Requirements Resolution, Initial | 4.50 | 92 | 1.29 | 15 | 3.38 | 78 | 3.0 | 50 |

TABLE D.1-2 (Continued)

| MAJOR FACTOR | INITIATION SUCCESS — TOP QUARTILE — AVERAGE VALUE | INITIATION SUCCESS — TOP QUARTILE — PERCENTILE | INITIATION SUCCESS — BOTTOM QUARTILE — AVERAGE VALUE | INITIATION SUCCESS — BOTTOM QUARTILE — PERCENTILE | EXECUTION SUCCESS — TOP QUARTILE — AVERAGE VALUE | EXECUTION SUCCESS — TOP QUARTILE — PERCENTILE | EXECUTION SUCCESS — BOTTOM QUARTILE — AVERAGE VALUE | EXECUTION SUCCESS — BOTTOM QUARTILE — PERCENTILE |
|---|---|---|---|---|---|---|---|---|
| **Execution** | | | | | | | | |
| Service Enthusiasm, Lead | 8.63 | 83 | 6.75 | 53 | 7.83 | 59 | 5.33 | 29 |
| Service Enthusiasm, Service B | 8.63 | 59 | 4.38 | 42 | 6.50 | 53 | 3.20 | 41 |
| Service Enthusiasm, Service C | 7.00 | 78 | 5.00 | 44 | 4.00 | 39 | 6.00 | 52 |
| Funding Commitment, Lead | 6.38 | 39 | 7.50 | 65 | 8.17 | 80 | 5.83 | 30 |
| Funding Commitment, Service B | 7.00 | 58 | 5.25 | 27 | 8.00 | 94 | 4.20 | 23 |
| Funding Commitment, Service C | 3.00 | 14 | 5.50 | 57 | 6.00 | 52 | 7.00 | 71 |
| Cost Sharing Stability | 7.50 | 77 | 5.83 | 51 | 5.83 | 32 | 3.83 | 25 |
| Cost Sharing Helped | 0.57 | 57% | 0.80 | 80 | 0.83 | 83 | 0.67 | 67 |
| Cost Sharing Problems | 0.25 | 25% | 0.50 | 50 | 0.33 | 33 | 0.83 | 83 |
| Program Funding Internal Support, Lead | 6.00 | 47 | 7.13 | 58 | 8.00 | 69 | 4.56 | 34 |
| Program Funding Internal Support, Service B | 6.67 | 49 | 5.13 | 34 | 8.00 | 80 | 4.40 | 27 |
| Program Funding Internal Support, Service C | 3.00 | 25 | 5.50 | 44 | 6.00 | 46 | 8.00 | 75 |
| External Funding Support | 5.71 | 26 | 7.38 | 59 | 6.83 | 50 | 7.17 | 57 |
| Acquisition Strategy | 6.51 | 38 | 7.20 | 61 | 6.67 | 43 | 6.80 | 47 |
| Charter Need | 0.40 | 40 | 0.83 | 83 | 0.50 | 50 | 0.80 | 80 |
| Configuration Stability | 7.29 | 57 | 3.75 | 20 | 8.00 | 70 | 6.83 | 48 |
| Cost Estimating Problems | 0.14 | 14 | 0.29 | 29 | 0 | | 0 | |
| Integrated Plan Execution | 8.75 | 48 | 6.83 | 20 | 8.17 | 61 | 7.60 | 43 |
| Program Manager Authority | 8.43 | 83 | 5.57 | 19 | 8.50 | 85 | 7.17 | 51 |
| Charter Effectiveness | 7.40 | 56 | 5.83 | 31 | 7.25 | 52 | 7.50 | 58 |
| Program Manager Limitations | 8.43 | 77 | 6.86 | 45 | 8.83 | 86 | 7.00 | 50 |
| Organizational Effectiveness | 8.00 | 61 | 6.00 | 33 | 8.00 | 61 | 7.33 | 48 |
| Organizational Structure | 2.63 | | 2.50 | | 2.83 | | 2.83 | |
| Organizational Appropriateness | 7.43 | 50 | 5.25 | 14 | 7.50 | 53 | 7.33 | 51 |
| Manning Levels, Lead | 8.50 | 58 | 8.38 | 52 | 8.67 | 67 | 8.67 | 67 |
| Manning Levels, Service B | 6.17 | 38 | 4.50 | 28 | 8.83 | 87 | 7.00 | 47 |
| Manning Levels, Service C | 6.00 | 71 | 4.50 | 39 | 5.50 | 57 | 6.00 | 71 |
| Oversight Multiple Reporting | 7.83 | 63 | 4.00 | 24 | 7.33 | 54 | 6.00 | 45 |
| Technical Requirements Resolution, Current | 4.67 | 94 | 1.00 | 17 | 4.00 | 83 | 2.83 | 43 |
| 5-Year R&D Funding Instability | 73.4 | 54 | 233.76 | 93 | 55.33 | 42 | 155.33 | 74 |
| 3-Year R&D Funding Instability | 42.25 | 47 | 55.0 | 61 | 27.67 | 30 | 62.67 | 73 |
| 3-Year Production Funding Instability | 18.60 | 55 | | | 11.00 | 25 | 22.50 | 70 |
| 5-Year Production Funding Instability | 44.40 | 45 | | | 100.00 | 87 | 54.00 | 53 |

## TABLE D.1-2 (Continued)

| MAJOR FACTOR | INITIATION SUCCESS: TOP QUARTILE AVERAGE VALUE | INITIATION SUCCESS: TOP QUARTILE PERCENTILE | INITIATION SUCCESS: BOTTOM QUARTILE AVERAGE VALUE | INITIATION SUCCESS: BOTTOM QUARTILE PERCENTILE | EXECUTION SUCCESS: TOP QUARTILE AVERAGE VALUE | EXECUTION SUCCESS: TOP QUARTILE PERCENTILE | EXECUTION SUCCESS: BOTTOM QUARTILE AVERAGE VALUE | EXECUTION SUCCESS: BOTTOM QUARTILE PERCENTILE |
|---|---|---|---|---|---|---|---|---|
| **Success** | | | | | | | | |
| Compound Rate of R&D Cost Growth | 0.24 | 37 | 0.12 | 78 | -0.06 | 10 | 0.10 | 65 |
| Compound Rate of Production Cost Growth | 0.07 | | 0.27 | | 0.04 | | 0.06 | |
| Compound Rate of Schedule Slippage | 0.09 | | 0.095 | | 0.09 | | 0.05 | |
| Average Rate of Supportability | 1.04 | | 1.28 | | 0.97 | | 0.88 | |
| Average Rate of Performance | 1.05 | | 0.96 | | 1.23 | | 0.88 | |
| Selection Harmony | 3.88 | | 1.63 | | 2.83 | | 2.33 | |
| Initiation Harmony | 4.00 | | 2.63 | | 3.67 | | 3.67 | |
| Execution Hsrmony | 3.14 | | 2.00 | | 2.83 | | 1.83 | |
| **Logistics** | | | | | | | | |
| Reliability & Maintainability | 6.29 | 66 | 5.71 | 40 | 7.20 | 64 | 6.83 | 55 |
| Logistics Planning Management Index | 5.71 | 54 | 6.71 | 70 | 6.40 | 65 | 5.67 | 54 |
| Support Maintenance Concept | 6.29 | 56 | 6.57 | 61 | 7.00 | 68 | 6.00 | 52 |
| Integrated Support Management | 5.57 | 58 | 6.83 | 76 | 6.00 | 64 | 5.00 | 50 |
| Logistics Commonality | 7.71 | 82 | 6.00 | 39 | 8.20 | 94 | 4.67 | 26 |
| Support Index, Lead | 8.29 | 67 | 6.50 | 32 | 7.75 | 52 | 7.0 | 41 |
| Support Index, Service B | 8.17 | 63 | | | 7.00 | 47 | 7.67 | 55 |
| Support Index, Service C | 3.00 | 50 | | | 3.00 | 50 | | |
| Support In Place, Lead | 8.29 | 62 | 7.50 | 47 | 8.00 | 55 | 7.25 | 44 |
| Support In Place, Service B | 7.83 | 60 | | | 7.25 | 53 | 7.67 | 58 |
| Support In Place, Service C | 2.00 | 100 | | | 2.00 | | | |
| Spares Availability, Lead | 7.86 | 51 | 7.00 | 32 | 8.25 | 61 | 7.00 | 32 |
| Spares Availability, Service B | 8.00 | 56 | | | 7.00 | 31 | 7.60 | 46 |
| Spares Availability, Service C | 2.00 | 100 | | | 2.00 | 100 | 0 | |
| Depot Maintenance, Lead | 7.86 | 53 | 7.00 | 45 | 7.00 | 45 | 7.75 | 49 |
| Depot Maintenance, Service B | 8.20 | 53 | | | 7.00 | 40 | 8.00 | 47 |
| Depot Maintenance, Service C | 3.00 | 100 | | | 3.00 | 100 | | |
| Support Equipment Availability, Lead | 9.14 | 83 | 6.00 | 20 | 8.50 | 78 | 7.25 | 54 |
| Support Equipment Availability, Service B | 9.33 | 82 | | | 8.50 | 70 | 8.33 | 69 |
| Support Equipment Availability, Service C | 8.00 | 100 | | | 8.00 | 100 | | |

TABLE D.1-2 (Continued)

| MAJOR FACTOR | INITIATION SUCCESS | | | | EXECUTION SUCCESS | | | |
|---|---|---|---|---|---|---|---|---|
| | TOP QUARTILE | | BOTTOM QUARTILE | | TOP QUARTILE | | BOTTOM QUARTILE | |
| | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE |
| Test | | | | | | | | |
| Joint Test Program | | | 1.50 | | | | 1.0 | |
| Joint Test Program Appropriate | 1.00 | | 0.50 | | 1.00 | | 0.67 | |
| Joint Test Commonality | 3.00 | | 1.00 | | 3.00 | | 1.33 | |
| Joint Test & Evaluation Master Plan | | | 0.75 | | 0.50 | | 0.33 | |
| JTEMP Adequacy | 1.00 | | 0.67 | | 0.50 | | 1.00 | |
| JTEMP Timeliness | 1.00 | | 0.50 | | 0.50 | | 0.67 | |
| Planned Tests Completed | | | 0.50 | | 1.00 | | 1.00 | |
| OT&E Requirements | 2.00 | | 2.00 | | 1.50 | | 2.67 | |
| Adequate Test Articles Provided | 3.00 | | 2.5 | | 3.00 | | 2.50 | |
| Joint Test Index | 0.69 | 67 | 0.57 | 40 | 0.67 | 61 | 0.59 | 45 |

TABLE D.1-2 (Continued)

| NON-MAJOR FACTOR | INITIATION SUCCESS | | | | EXECUTION SUCCESS | | | |
|---|---|---|---|---|---|---|---|---|
| | TOP QUARTILE | | BOTTOM QUARTILE | | TOP QUARTILE | | BOTTOM QUARTILE | |
| | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE | AVERAGE VALUE | PERCENTILE |
| **Pre-Joint Environment** | | | | | | | | |
| Pre-Joint Environment | 8.00 | 80 | 6.20 | 24 | 7.45 | 57 | 6.50 | 26 |
| Prior Effort, Lead | 8.56 | 80 | 6.27 | 33 | 7.92 | 64 | 6.29 | 33 |
| Prior Effort, Service B | 5.25 | 63 | 6.50 | 74 | 5.08 | 61 | 5.29 | 63 |
| Prior Effort, Service C | 7.00 | 85 | 4.75 | 68 | 5.25 | 73 | 3.75 | 59 |
| Point In Acquisition Cycle, Lead | 2.78 | | 2.10 | | 3.27 | | 2.00 | |
| Point In Acquisition Cycle, Service B | 1.50 | | 1.91 | | 1.89 | | 2.29 | |
| Point In Acquisition Cycle, Service C | 2.00 | | 1.60 | | 2.33 | | 2.00 | |
| Documented Need, Lead | 0.88 | | 0.73 | | 0.83 | | 0.57 | |
| Documented Need, Service B | 0.44 | | 0.70 | | 0.58 | | 0.50 | |
| Documented Need, Service C | 0.66 | | 0.25 | | 0.50 | | 0.25 | |
| Priority of Need, Lead | 1.89 | | 2.45 | | 2.00 | | 1.86 | |
| Priority of Need, Service B | 2.11 | | 2.20 | | 1.75 | | 1.86 | |
| Priority of Need, Service C | 2.50 | | 2.00 | | 2.33 | | 1.75 | |
| **Selection and Initiation** | | | | | | | | |
| Technical Requirements Similarity Index | 1.00 | 100 | 0.64 | 22 | 0.92 | 52 | 0.80 | 28 |
| Timeliness Similarity Index | 1.00 | | 0.38 | | 0.58 | | 0.67 | |
| Roles and Missions Differences | 0 | | 0 | | 0 | | 0 | |
| Source of Jointness | 0.30 | 70 | | | | | | |
| Rationale Index | 2.78 | | 2.55 | | 2.25 | | 2.14 | |
| Basis for Lead Selection | 2.88 | | 3.91 | | 3.25 | | 3.14 | |
| Designation of Lead | 2.88 | | 2.91 | | 2.75 | | 2.43 | |
| Inter-Service Agreement | 8.00 | 73 | 5.73 | 44 | 7.00 | 59 | 6.29 | 50 |
| Negotiation Level | 3.75 | | 3.09 | | 3.50 | | 3.17 | |
| Memorandum of Agreement | 0.75 | | 0.64 | | 0.64 | | 0.57 | |
| Technical Requirements Compromise, Lead | 5.00 | | 2.73 | | 4.55 | | 3.29 | |
| Technical Requirements Compromise, Service B | 5.00 | | 2.55 | | 4.42 | | 3.14 | |
| Technical Requirements Compromise, Service C | 5.00 | | 2.50 | | 4.50 | | 4.33 | |
| Timeliness Compromise, Lead | 0.29 | | 0.37 | | 0.33 | 1/3YR | 0.17 | 1/6YR |
| Timeliness Compromise, Service B | 0.29 | | 0.09 | | 0.33 | 1/3YR | 0.14 | 1/7YR |
| Commonality Percentage | 1.00 | 100 | 0.89 | 23 | 0.97 | 42 | 0.92 | 32 |
| Cost Sharing Agreement | 1.56 | | 1.22 | | 1.60 | | 1.30 | |
| Cost Benefit Analysis | 0 | 0 | 0.09 | 9 | 0.09 | | 0 | |
| Charter Existence | 0.44 | 44 | 0.6 | 67 | 0.73 | 73 | 0.71 | 71 |
| Technical Complexity | 5.22 | 60 | 5.20 | 60 | 4.09 | 48 | 3.86 | 45 |
| Commonality of Specifications | 6.20 | 12 | 8.33 | 87 | 8.00 | 28 | 8.43 | 40 |
| Technical Requirements Resolution, Initial | 4.71 | 90 | 2.27 | 23 | 4.33 | 77 | 3.29 | 47 |

TABLE D.1-2 (Continued)

| NON-MAJOR FACTOR | INITIATION SUCCESS TOP QUARTILE AVERAGE VALUE | INITIATION SUCCESS TOP QUARTILE PERCENTILE | INITIATION SUCCESS BOTTOM QUARTILE AVERAGE VALUE | INITIATION SUCCESS BOTTOM QUARTILE PERCENTILE | EXECUTION SUCCESS TOP QUARTILE AVERAGE VALUE | EXECUTION SUCCESS TOP QUARTILE PERCENTILE | EXECUTION SUCCESS BOTTOM QUARTILE AVERAGE VALUE | EXECUTION SUCCESS BOTTOM QUARTILE PERCENTILE |
|---|---|---|---|---|---|---|---|---|
| Execution | | | | | | | | |
| Service Enthusiasm, Lead | 8.33 | 70 | 4.55 | 20 | 8.00 | 58 | 5.00 | 30 |
| Service Enthusiasm, Service B | 7.33 | 54 | 5.00 | 30 | 8.37 | 76 | 4.00 | 27 |
| Service Enthusiasm, Service C | 5.67 | 60 | 3.25 | 25 | 6.75 | 70 | 5.33 | 25 |
| Funding Commitment, Lead | 6.89 | 57 | 6.80 | 54 | 7.46 | 70 | 7.00 | 60 |
| Funding Commitment, Service B | 7.29 | 58 | | | 7.70 | 67 | 5.00 | 22 |
| Funding Commitment, Service C | 4.00 | 30 | 2.00 | 10 | 7.50 | 73 | 5.67 | 46 |
| Cost Sharing Stability | 7.67 | 58 | 6.11 | 26 | 8.20 | 68 | 4.86 | 17 |
| Cost Sharing Helped | 0.75 | 75 | 0.88 | 88 | 0.78 | 78 | 0.67 | 67 |
| Cost Sharing Problems | 0.25 | 25 | 0.56 | 56 | 0.22 | 22 | 0.71 | 71 |
| Program Funding Internal Support, Lead | 7.00 | 62 | 6.3 | 47 | 7.82 | 78 | 6.29 | 47 |
| Program Funding Internal Support, Service B | 7.57 | 66 | 5.67 | 32 | 7.90 | 72 | 3.40 | 17 |
| Program Funding Internal Support, Service C | 4.00 | 44 | 2.00 | 22 | 7.50 | 81 | 5.00 | 50 |
| External Funding Support | 8.00 | 50 | 8.40 | 59 | 7.36 | 40 | 7.83 | 50 |
| Acquisition Strategy | 8.13 | 78 | 5.50 | 22 | 8.18 | 80 | 6.67 | 37 |
| Charter Need | 0.44 | 44 | 0.78 | 78 | 0.50 | 50 | 0.86 | 86 |
| Configuration Stability | 7.00 | 35 | 7.00 | 35 | 8.30 | 67 | 6.33 | 29 |
| Cost Estimating Problems | 0 | 0 | 0.22 | 22 | 0.00 | | 0.14 | |
| Integrated Plan Execution | 9.00 | 82 | 5.11 | 24 | 8.40 | 71 | 5.29 | 24 |
| Program Manager Authority | 8.11 | 68 | 6.90 | 34 | 8.27 | 74 | 7.14 | 40 |
| Charter Effectiveness | 8.25 | 75 | 7.17 | 41 | 8.14 | 73 | 6.57 | 32 |
| Program Manager Limitations | 8.44 | 68 | 7.30 | 29 | 8.73 | 78 | 7.71 | 43 |
| Organizational Effectiveness | 7.77 | 81 | 6.30 | 36 | 7.45 | 70 | 6.29 | 36 |
| Organizational Structure | 2.70 | | 2.18 | | 1.92 | | 1.86 | |
| Organizational Appropriateness | 8.50 | 83 | 6.09 | 32 | 7.67 | 66 | 6.29 | 36 |
| Manning Levels, Lead | 7.77 | 56 | 8.22 | 71 | 8.09 | 68 | 8.17 | 70 |
| Manning Levels, Service B | 6.50 | 37 | 8.86 | 80 | 6.14 | 32 | 7.33 | 51 |
| Manning Levels, Service C | 2.00 | 20 | 10.00 | 100 | | | 5.00 | |
| Oversight Multiple Reporting | 8.67 | 76 | 8.00 | 53 | 7.82 | 48 | 8.14 | 58 |
| Technical Requirements Resolution, Current | 4.71 | 90 | 1.91 | 21 | 4.33 | 77 | 2.29 | 26 |
| 5-Year R&D Funding Instability | 142.80 | 87 | 94.5 | 78 | 58.40 | 66 | 62.33 | 70 |
| 3-Year R&D Funding Instability | 45.00 | 87 | 36.17 | 71 | 30.50 | 65 | 23.67 | 58 |
| 3-Year Production Funding Instability | 30.00 | 50 | 32.75 | 61 | | | 45.00 | 100 |
| 5-Year Production Funding Instability | 51.50 | 50 | 119.50 | 66 | 189.50 | 76 | 74.00 | 57 |

# TABLE D.1-2 (Continued)

| NON-MAJOR FACTOR | INITIATION SUCCESS: TOP QUARTILE AVERAGE VALUE | INITIATION SUCCESS: TOP QUARTILE PERCENTILE | INITIATION SUCCESS: BOTTOM QUARTILE AVERAGE VALUE | INITIATION SUCCESS: BOTTOM QUARTILE PERCENTILE | EXECUTION SUCCESS: TOP QUARTILE AVERAGE VALUE | EXECUTION SUCCESS: TOP QUARTILE PERCENTILE | EXECUTION SUCCESS: BOTTOM QUARTILE AVERAGE VALUE | EXECUTION SUCCESS: BOTTOM QUARTILE PERCENTILE |
|---|---|---|---|---|---|---|---|---|
| **Success** | | | | | | | | |
| Compound Rate of R&D Cost Growth | 0.84 | 90 | 1.65 | 92 | 0.175 | 70 | 0.29 | 79 |
| Compound Rate of Production Cost Growth | -0.03 | | 0.22 | | -0.03 | | 0.44 | |
| Compound Rate of Schedule Slippage | 2.79 | | 0.26 | | 1.99 | | 0.23 | |
| Average Rate of Supportability | 5.15 | | 0.75 | | 2.76 | | 1.00 | |
| Average Rate of Performance | 1.23 | | 0.98 | | 1.19 | | 0.89 | |
| Selection Harmony | 4.00 | | 2.45 | | 3.67 | | 2.00 | |
| Initiation Harmony | 4.00 | | 3.00 | | 4.00 | | 3.43 | |
| Execution Harmony | 3.20 | | 2.22 | | 3.33 | | 1.43 | |
| **Logistics** | | | | | | | | |
| Reliability & Maintainability | 5.00 | 29 | 6.33 | 58 | 7.10 | 58 | 6.00 | 44 |
| Logistics Planning Management Index | 4.57 | 47 | 5.44 | 55 | 6.00 | 59 | 6.00 | 59 |
| Support Maintenance Concept | 4.71 | 40 | 5.89 | 58 | 6.50 | 73 | 6.00 | 60 |
| Integrated Support Management | 4.00 | 51 | 4.89 | 54 | 5.00 | 54 | 6.00 | 66 |
| Logistics Commonality | 6.86 | 32 | 7.25 | 40 | 8.25 | 64 | 8.00 | 61 |
| Support Index, Lead | 8.50 | 70 | 8.60 | 73 | 8.67 | 75 | 8.00 | 52 |
| Support Index, Service B | 7.50 | 43 | 9.00 | 93 | 8.17 | 66 | 8.00 | 60 |
| Support Index, Service C | | | | | | | | |
| Support In Place, Lead | 8.25 | 72 | 8.00 | 65 | 8.22 | 71 | 8.00 | 65 |
| Support In Place, Service B | 6.50 | 20 | 8.33 | 80 | 7.33 | 42 | 8.00 | 73 |
| Support In Place, Service C | | | | | | | | |
| Spares Availability, Lead | 8.33 | 56 | 9.00 | 77 | 8.63 | 65 | 8.00 | 45 |
| Spares Availability, Service B | 6.50 | 30 | 8.67 | 80 | 7.83 | 62 | 8.00 | 67 |
| Spares Availability, Service C | | | | | | | | |
| Depot Maintenance, Lead | 9.25 | 81 | 9.25 | 81 | 9.25 | 81 | | |
| Depot Maintenance, Service B | 9.00 | 62 | 9.50 | 81 | 9.17 | 68 | | |
| Depot Maintenance, Service C | | | | | | | | |
| Support Equipment Availability, Lead | 9.00 | 71 | 8.80 | 69 | 8.86 | 69 | 8.00 | 57 |
| Support Equipment Availability, Service B | 9.00 | 71 | 9.33 | 81 | 8.60 | 69 | 8.00 | 64 |
| Support Equipment Availability, Service C | | | | | | | | |

TABLE D.1-2 (Continued)

| NON-MAJOR FACTOR | INITIATION SUCCESS: TOP QUARTILE AVERAGE VALUE | INITIATION SUCCESS: TOP QUARTILE PERCENTILE | INITIATION SUCCESS: BOTTOM QUARTILE AVERAGE VALUE | INITIATION SUCCESS: BOTTOM QUARTILE PERCENTILE | EXECUTION SUCCESS: TOP QUARTILE AVERAGE VALUE | EXECUTION SUCCESS: TOP QUARTILE PERCENTILE | EXECUTION SUCCESS: BOTTOM QUARTILE AVERAGE VALUE | EXECUTION SUCCESS: BOTTOM QUARTILE PERCENTILE |
|---|---|---|---|---|---|---|---|---|
| **Test** | | | | | | | | |
| Joint Test Program | 0 | | 1.80 | | 0 | | 0.67 | |
| Joint Test Program Appropriate | | | 1.00 | | 1.00 | | 1.00 | |
| Joint Test Commonality | | | 2.60 | | 3.00 | | 2.67 | |
| Joint Test & Evaluation Master Plan | 0 | | 0.80 | | 0 | | 0.67 | |
| JTEMP Adequacy | 1.00 | | 0.75 | | 1.00 | | 0.67 | |
| JTEMP Timeliness | 0 | | 0.75 | | 0 | | 1.00 | |
| Planned Tests Completed | 1.00 | | 0.75 | | | | 1.00 | |
| OT&E Requirements | 0 | | 2.00 | | 2.00 | | 2.67 | |
| Adequate Test Articles Provided | 3.00 | | 2.25 | | 0 | | 3.00 | |
| Joint Test Index | 0.55 | 20 | 0.55 | 20 | 0.56 | 30 | 0.69 | 77 |

Correlation Analyses - Other techniques employed to evaluate the significance of factor/success relationships included correlation and regression analyses. These two techniques are similar, yet distinct. Correlation analysis measures the degree of relationship or association between two variables. The value of a correlation coefficient lies between -1 and +1. A minus value indicates that the two variables move in opposite directions. A positive value indicates that the two variables move in the same direction. A value of either minus one or plus one would indicate that all the data points defined by combinations of the two variables lie on a straight line. This implies a very strong cause and effect relationship between the two variables. In the real world, however, such relationships are rare. Rather, a distribution of data points defined by combinations of two variables is scattered, as illustrated in Figure D.1-1. However, the

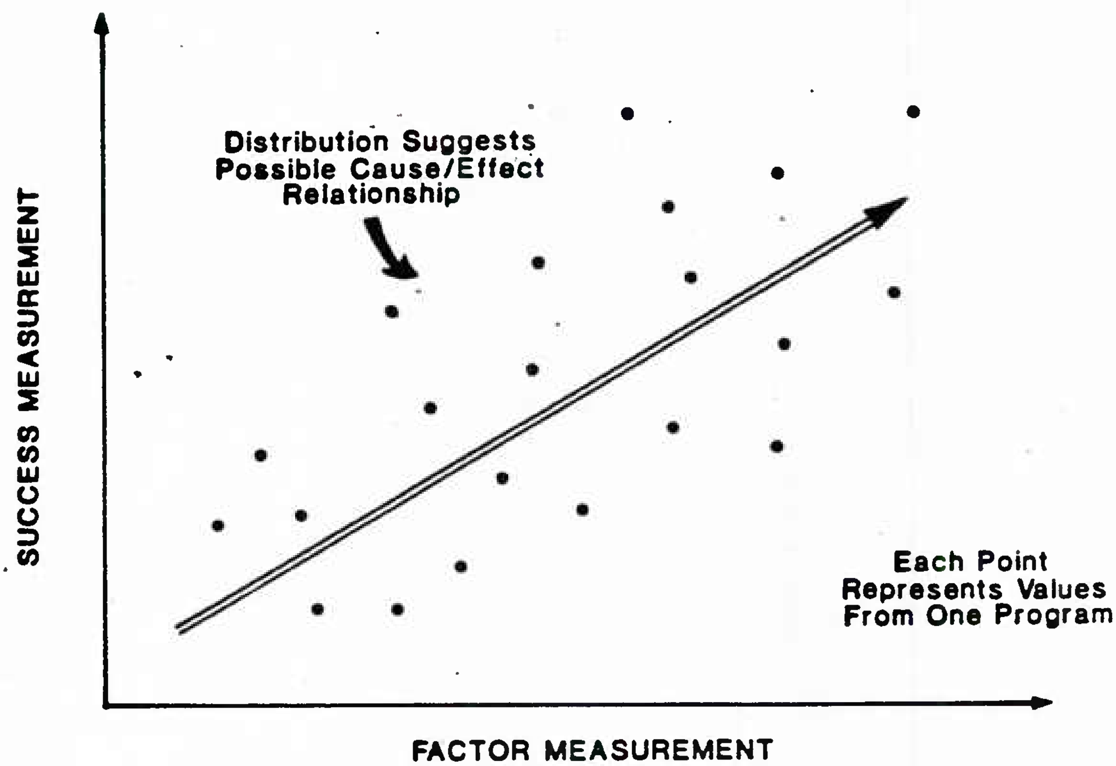


Figure D.1-1 Correlation of Factor and Success Measures

distribution may take on a distinct shape, implying a potential relationship between changes in the values of the two variables. If there is no shape to the distribution, i.e., it is randomly scattered, there is no relationship, and the correlation coefficient will be near zero. Correlation coefficients were computed for hundreds of combinations of factors and success measures to identify those factors that seemed to have the greatest correlation with joint program success measurements. Table D.1-3 presents some of the more significant correlation coefficients computed for factor/success measure combinations.

## D.2 MAJOR VERSUS NON-MAJOR PROGRAMS

The organizational structure, the size, the reporting procedures required, and the interest level of major programs make them different from non-major programs. Non-major programs tend to be smaller (in terms of total program dollars), to have fewer reporting requirements, and to encounter a level of interest that is not as high as it is for major programs. These substantial differences necessitated that the 80 joint programs be analyzed in sub-categories of major and non-major systems.

### D.2.1 Pre-Joint Environment Factors

The pre-joint environment of a program was assessed to determine whether the factors that characterized the program prior to its establishment as a joint program had an

## TABLE D.1-3
## CORRELATIONS

| FACTOR | CORRELATION |
|---|---|
| **PRODUCTION COST GROWTH** | |
| Timeliness Similarity Index | .34 |
| 3-Year Production Funding Instability | .25 |
| Technical Requirements Compromise, Current | .21 |
| Acquisition Phase When Joint | .18 |
| External Funding Support | .16 |
| Establishment Harmony | .14 |
| Technical Requirements Similarity | -.41 |
| Technical Requirements Resolution, Initial | -.36 |
| Technical Requirements Resolution, Current | -.35 |
| Technical Requirements Compromise* | -.34 |
| Program Manager Authority | -.28 |
| Selection Harmony | -.27 |
| Cost Sharing Stability | -.20 |
| Compound Rate of Schedule Slippage | -.16 |
| **R&D COST GROWTH** | |
| Timeliness Compromise Index, Lead Service | .72 |
| Five-year Production Funding Instability | .30 |
| Priority of Need, Lead Service | .21 |
| External Funding Support | .19 |
| Oversight Reporting | .15 |
| Technical Requirements Compromise, Current | -.81 |
| Manning Levels* | -.49 |
| Acquisition Strategy | -.42 |
| Initiation Harmony | -.37 |
| Organizational Appropriateness | -.33 |
| Program Manager Authority | -.28 |
| Organizational Effectiveness | -.27 |
| Manning Levels, Lead Service | -.24 |
| Funding Commitment, Lead | -.22 |
| Technical Requirements Compromise, Lead | -.19 |
| Technical Requirements Compromise, Initial | -.17 |
| Technical Complexity | -.17 |
| Technical Requirements Resolution, Current | -.16 |
| Internal Program Funding, Lead Service | -.15 |
| **SCHEDULE SLIPPAGE** | |
| Technical Requirements Compromise, Current | .31 |
| Internal Program Funding* | .22 |
| Point in Acquisition Cycle (Pre-Joint), Lead | .20 |
| Program Manager Limitations | .19 |

*Average For All Participants

TABLE D.1-3

CORRELATIONS (Continued)

| FACTOR | CORRELATION |
|---|---|
| **SCHEDULE SLIPPAGE** | |
| Execution Harmony | .18 |
| External Funding Support | .18 |
| Technical Requirements Resolution, Initial | .16 |
| Three-year Production Funding Instability | .16 |
| Technical Requirements Resolution, Current | .15 |
| Program Manager Authority | .14 |
| Manning Levels* | -.34 |
| Configuration Stability Index | -.21 |
| Technical Complexity | -.21 |
| **INITIATION SUCCESS** | |
| Technical Requirements Resolution, Current | .81 |
| Technical Requirements Similarity | .79 |
| Technical Requirements Resolution, Initial | .79 |
| Selection Harmony | .70 |
| Technical Requirements Compromise* | .69 |
| Initiation Harmony | .63 |
| Technical Requirements Compromise, Current | .56 |
| Commonality Percentage | .48 |
| Three-year Production Funding Instability | -.26 |
| Technical Complexity | -.21 |
| R&D Cost Growth | -.17 |
| Manning Levels* | -.16 |
| **EXECUTION SUCCESS** | |
| Execution Harmony | .64 |
| Technical Requirements Resolution, Current | .49 |
| Selection Harmony | .46 |
| Internal Program Funding* | .40 |
| Program Manager Authority | .38 |
| Technical Requirements Similarity | .36 |
| Technical Requirements Resolution, Initial | .32 |
| Configuration Stability Index | .29 |
| Organizational Effectiveness | .24 |
| Acquisition Strategy | .24 |
| Initiation Harmony | .24 |
| Acquisition Phase When Made Joint | .21 |
| Organizational Appropriateness | .19 |
| Commonality Percentage | .17 |
| Three-year Production Funding Instability | -.51 |
| Production Cost Growth | -.33 |
| Five-year R&D Funding Instability | -.10 |

*Average For All Participants

impact on the outcome of the joint program. Table D.2-1 displays the mean values for each of the four pre-joint environment factors for major, non-major, and all programs.

TABLE D.2-1

PRE-JOINT ENVIRONMENT FACTORS

| | Major Programs | All Programs | Non-Major Programs |
|---|---|---|---|
| Prior Effort of Lead Service | 8.2 | 7.5 | 7.1 |
| Prior Effort of Participating Service B | 6.4 | 5.5 | 4.9 |
| Prior Effort of Participating Service C | 3.9 | 4.2 | 4.3 |
| Point in Acquisition Cycle Lead | 2.2 | 2.5 | 2.6 |
| Point in Acquisition Cycle Participating Service B | 1.7 | 1.7 | 1.7 |
| Point in Acquisition Cycle Participating Service C | 1.3 | 1.7 | 1.8 |
| Documented Need of Lead Service | 91% | 83% | 77% |
| Documented Need of Participating Service B | 85% | 70% | 58% |
| Documented Need of Participating Service C | 50% | 46% | 45% |
| Priority of Need of Lead Service | 1.5 | 1.9 | 2.2 |
| Priority of Need of Participating Service B | 1.8 | 2.0 | 2.1 |
| Priority of Need of Participating Service C | 1.7 | 2.2 | 2.4 |

Figure D.2-1 displays the acquisition phase the major and non-major programs were in prior to becoming joint.

The majority of both major and non-major programs became joint early in their acquisition cycles. Sixty-two percent of the major programs and 67 percent of the non-major programs became joint during pre-FSD, which does not represent a significant difference between major and non-major programs.

The prior effort factor was based on the involvement of each of the Services in an ongoing single Service program prior to becoming a joint program. The lead Service of major programs had a 13 percent higher level of prior effort than did the lead Service of non-major programs. The major programs' participating Service B had a 23 perent higher level of

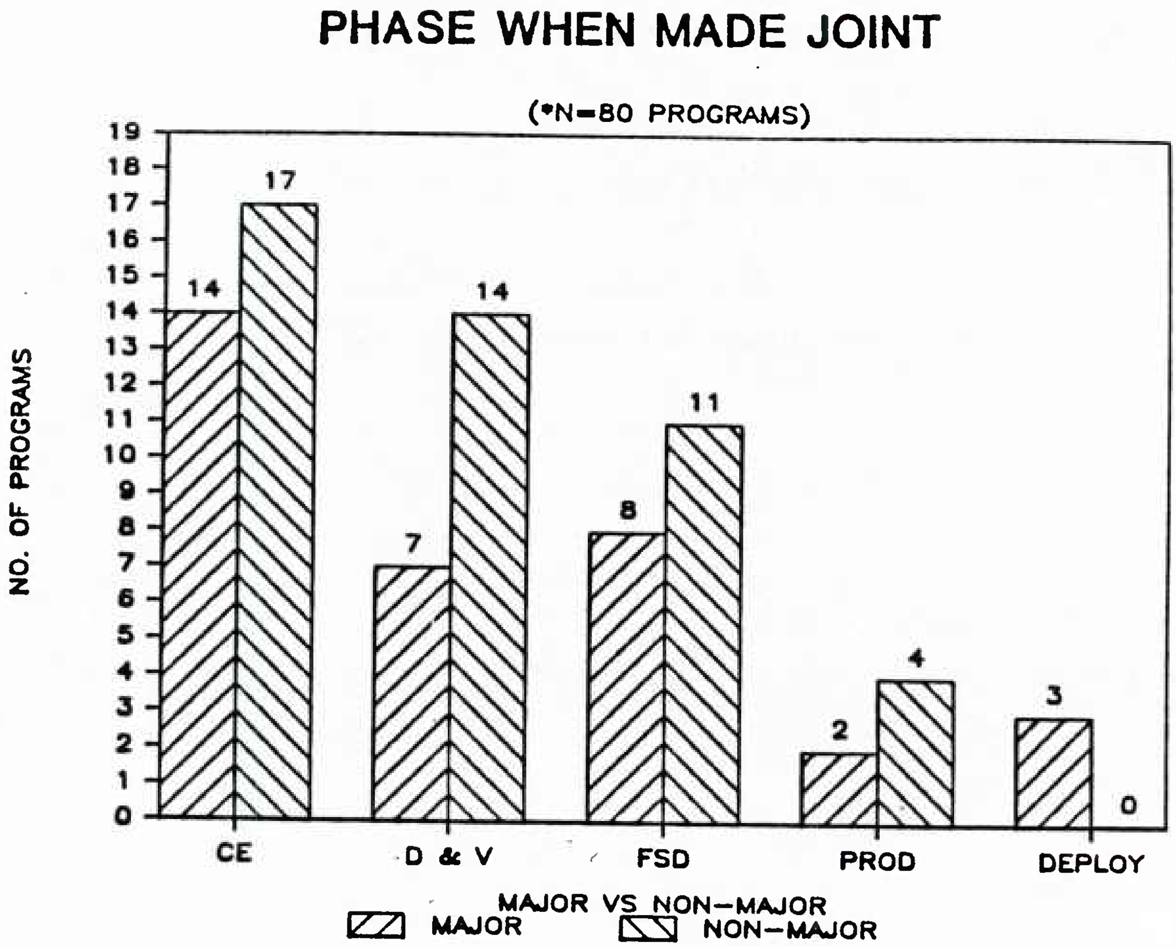


Figure D.2-1 Phase When Made Joint for Major and Non-Major Programs

prior effort than did the non-major participating Service B. The non-major programs' participating Service C had a higher level of effort than did the major programs' participating Service C.

As explained in Appendix C, the priority of need factor is rated on a scale of 1 to 3, where 1 equals greatest need and 3 equals least need. The major programs' participants had a higher priority of need for the end items than did the non-major programs' participants. The higher priority of

need, the greater prior effort, and the higher level of interest shown by Congress and OSD may explain why the documented need was higher for the lead Service in major programs as compared to non-major programs.

### D.2.2 Selection and Initiation Factors

The mean values for factors affecting the selection and initiation of joint programs are presented in Table D.2-2.

TABLE D.2-2
SELECTION AND INITIATION FACTORS

| | Major Programs | All Programs | Non-Major Programs |
|---|---|---|---|
| SCHEDULE AND COMMONALITY | | | |
| Timeliness Similarity Index | 1 Yr 5 Mos | 1 Year | 8 Months |
| Timeliness Compromise Index, Lead | 1 Month | 3 Months | 4 Months |
| Timeliness Compromise Index, Service B | 2 Months | 3 Months | 3 Months |
| Timeliness Comrpomise Index, Service C | 3 Months | 2 Months | 1 Month |
| Commonality Percentage | 80% | 87% | 92% |
| Commonality of Specifications | 74% | 81% | 86% |
| Roles & Missions Differences | 14% | 6% | 0% |
| TECHNICAL CONSIDERATIONS | | | |
| Technical Complexity | 6.97 | 5.77 | 4.88 |
| Technical Requirements Similarity Index | 24% | 79% | 83% |
| Technical Requirements Resolution, Initial | 3.23 | 3.51 | 3.71 |
| Technical Requirements Compromise, Lead | 3.47 | 3.79 | 4.02 |
| Technical Requirements Compromise, Service B | 3.48 | 3.66 | 3.79 |
| Technical Requirements Compromise, Service C | 3.17 | 3.77 | 4.00 |
| INTER- AND INTRA-SERVICE AGREEMENTS | | | |
| Charter Existence | 64% | 63% | 63% |
| Cost Benefit Analysis | 13% | 12% | 12% |
| Cost Sharing Agreement | 1.34 | 1.42 | 1.49 |
| Memorndum of Agreement | 84% | 68% | 56% |
| Inter-Service Agreements | 7.2 | 6.8 | 6.5 |
| Negotiation Level | 2.9 | 3.1 | 3.3 |
| EXTERNAL FACTORS | | | |
| External Selection for Jointness | 71% | 63% | 57% |
| Rationale Index for Jointness | 2.09 | 2.27 | 2.40 |
| Basis for Selection of Lead Service | 3.41 | 3.42 | 3.42 |
| Designation of Lead Service | 2.41 | 2.70 | 2.93 |

For ease of analysis and presentation, this matrix is separated into four categories of factors:

- Schedule and Commonality Factors
- Technical Factors
- Inter-Service Agreements
- External Factors.

Schedule and Commonality Factors - The timeliness smilarity index is a measure of the difference in years between the different Services' needed IOC dates. Services in major programs had greater differences in their needed IOC dates than did Services in non-major programs. Major programs averaged a 1.4 year difference in needed IOC dates, while non-major programs averaged only a 0.7 year difference. The timeliness compromise index measures the schedule compromise that resulted from having gone joint. It is the difference between the original Service-specific needed IOC date and the joint program IOC date decided upon at the time of jointness. This index shows that there was very little IOC date compromise for either major or non-major programs.

The commonality factor measures the percent of total program dollars spent on common equipment during R&D and production. Non-major programs were able to agree on a product with a higher degree of commonality than major programs (86 percent commonality and 74 percent commonality respectively). Non-major programs spent 8 percent of total program dollars on Service-unique equipment. For major programs this figure was 20 percent. This difference may be explained by Figure D.2-2 which shows that the majority (59 percent) of the non-major programs are either component/subsystems or $C^3I$ systems and these types of systems are more likely to have a higher degree of common specifications than other system types.

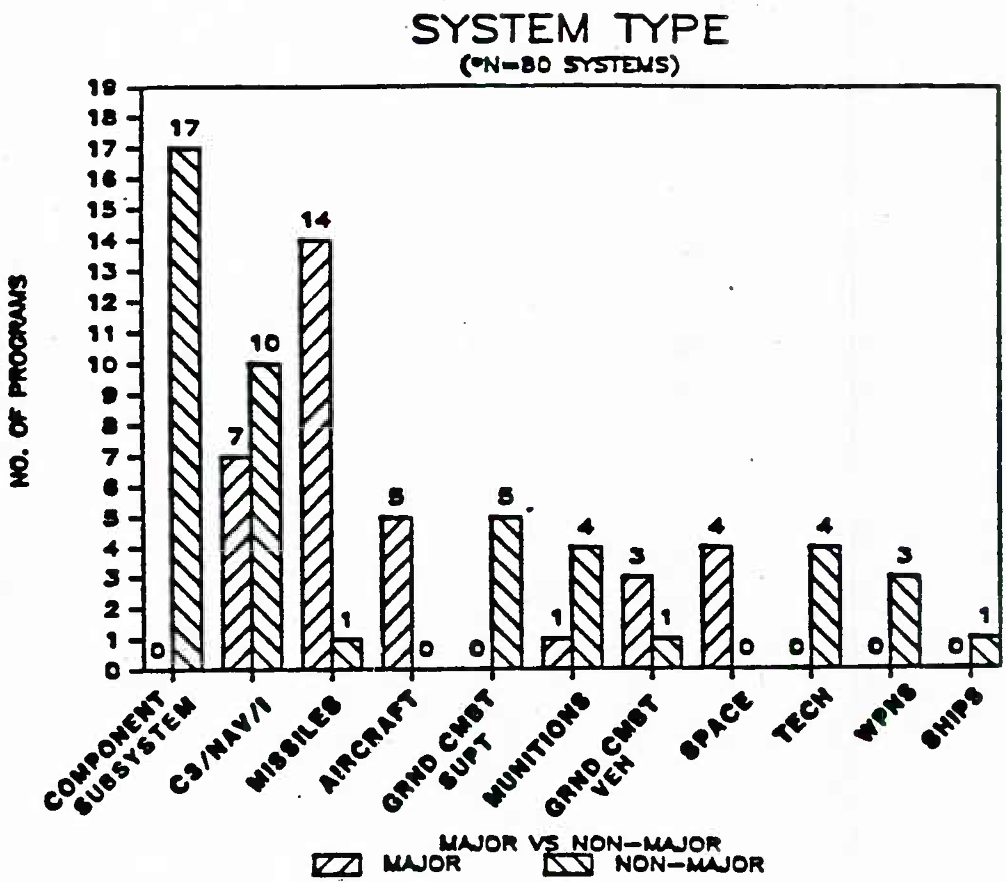


Figure D.2-2 Major and Non-Major System Types

Technical Factors - The technical complexity of a program (within a class of systems and not across systems) was determined by the number of subsystems and components involved, the total number of external interfaces, the difficulty of the technical integration, and the maturity of the technology. As one would expect, non-major systems have less technical complexity than major systems.

The technical requirements compromise factor assesses the compromise that occurred as a result of having gone joint by comparing the joint program end item to the original Service

requirement. Non-major programs have a lesser degree of technical requirements compromise than major programs. This could be due to the higher commonality of specifications for non-major systems.

As shown in Figure D.2-3, the more dissimilar the program participants' technical requirements, the greater the production cost growth. This premise is further supported by Figure D.2-4. Programs unable to resolve their requirements differences were more prone to production cost growth than programs that were able to resolve their differences through compromise.

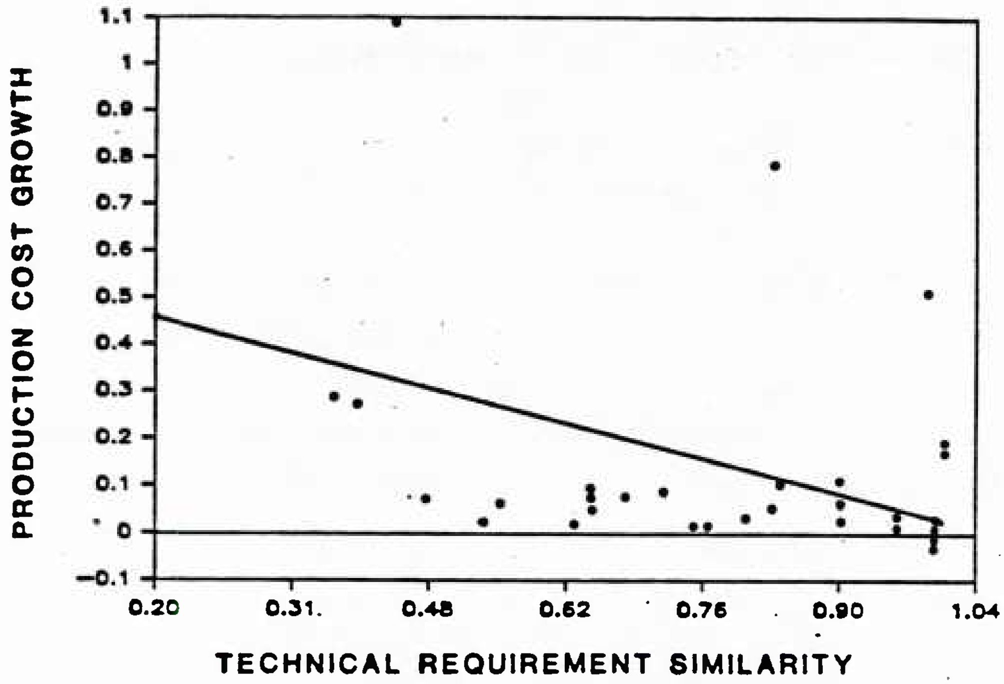


Figure D.2-3 Regression of Technical Requirements Similarity and Production Cost Growth

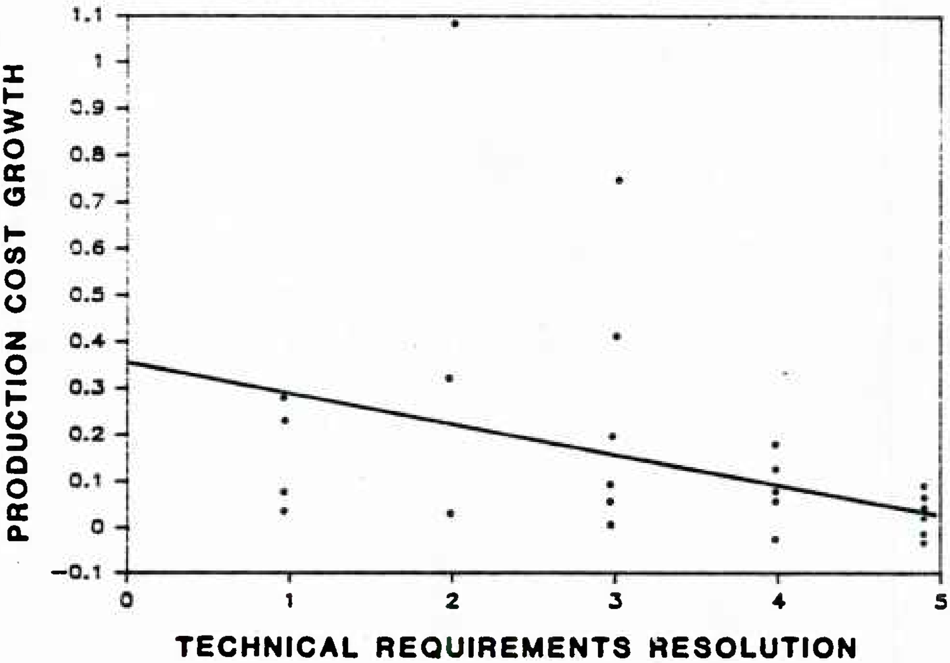


Figure D.2-4 Regression of Technical Requirements Resolution and Production Cost Growth

<u>Inter-Service Agreements</u> - Ninety-three percent of major and 84 percent of non-major programs had some form of cost sharing agreement. Major programs used more formal than informal cost sharing agreements, 61 percent and 32 percent respectively, whereas non-major programs made no preference for formal or informal cost sharing agreements (43 percent and 41 percent respectively).

Major programs were more likely than non-major programs to have inter-Service agreements and the majority of these agreements were negotiated at either the Service headquarters or the product division level. Table D.2-3 lists the level at which agreements were negotiated for both major and non-major programs. Major programs were also more likely to document their agreements with a Memorandum of Agreement (MOA) than were non-major programs.

TABLE D.2-3

AGREEMENT NEGOTIATION LEVEL

| MAJOR | | NON-MAJOR | |
|---|---|---|---|
| Service Secretariat | 16% | Service Secretariat | 2% |
| Service Headquarters | 37% | Service Headquarters | 33% |
| JLC | 6% | JLC | 20% |
| Product Division | 22% | Product Division | 28% |
| Other | 19% | Other | 17% |

External Factors - Congress and OSD were considered external sources for establishing jointness. The JCS, JLC, and Services were considered internal sources of jointness. More programs were externally chosen for jointness than internally. The percentage of major programs selected externally was greater (71 percent) than the percentage of non-major programs (51 percent) selected externally. Figure D.2-5 illustrates that OSD was the primary organization directing jointness for both major and non-major systems.

The rationales examined in this study for going joint were interoperability, cost savings, both interoperability and cost savings, or other. The two most common reasons cited for the major programs were both interoperability and cost savings (47 percent) and cost savings (38 percent). The two most common reasons cited for non-major programs were cost savings (60 percent) and both interoperability and cost savings (33 percent). Although cost savings was consistently cited as a major reason for jointness, 88 percent of the programs performed no cost benefit analysis to determine what those cost savings would be, and in no case could a documented cost benefit analysis on the benefits for jointness be found.

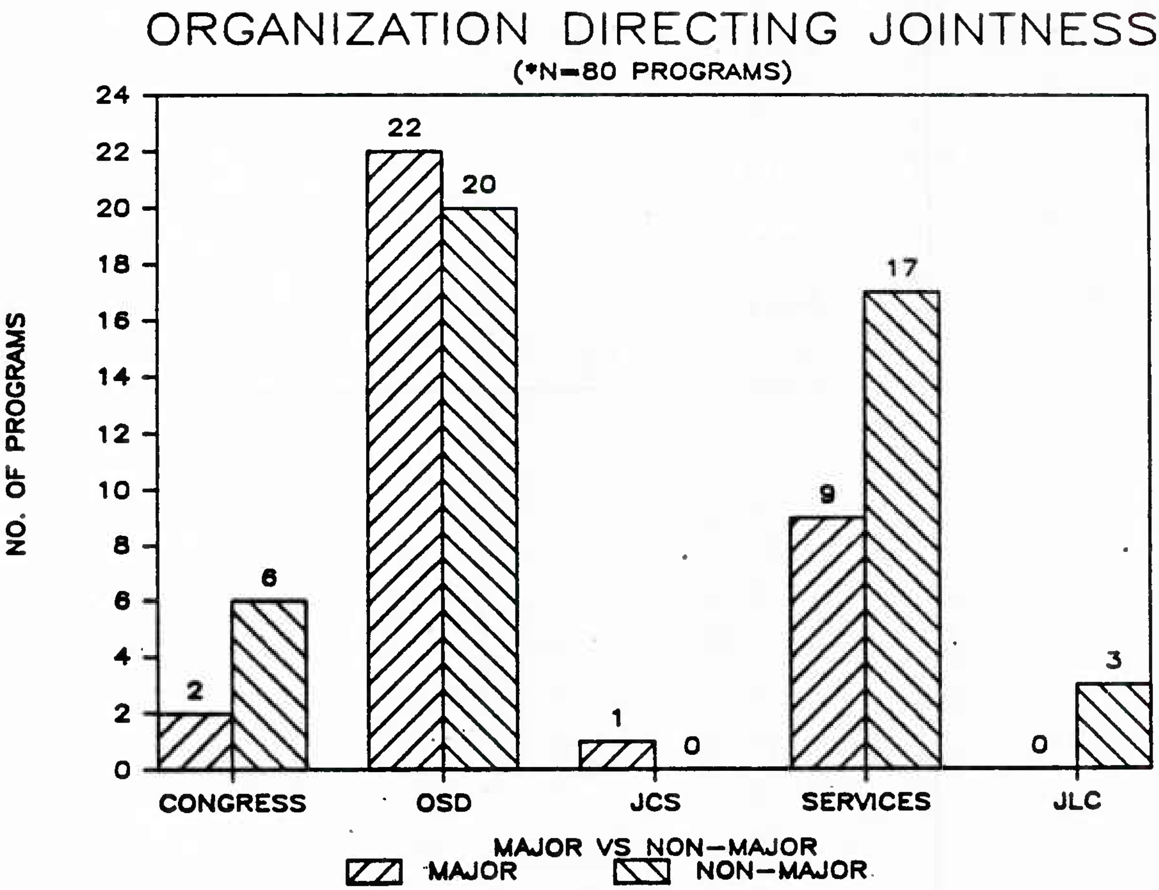


Figure D.2-5 Organization Directing Major and Non-Major Programs

Once the program was slated to become joint, a lead Service was designated. Seventy percent of major programs had their lead Service selected by OSD. The Service selected was chosen either because of an ongoing effort or because of a more advanced technical capability. Forty-four percent of non-major programs had their lead Services selected by OSD. In those cases where OSD did select the lead for non-major programs, the technical capability from an ongoing effort was cited 56 percent of the time as the reason for the selection. Other reasons given for the selection of the lead Service for major and non-major programs were: the Service selected had

the greatest need, 18 percent for major and 9 percent for non-major; the Service selected planned the largest buy or to spend the most dollars, 12 percent for major and 16 percent for non-major; or there was a prior agreement, 6 percent for major and 12 percent for non-major.

### D.2.3 Execution Factors

Program execution factors, listed in Table D.2-4, are separated into the categories of: funding, internal environment, and effectiveness.

Funding -Cost sharing agreements were affected by many extraneous factors which could not be isolated; therefore, no meaningful relationships were found among cost sharing agreements, cost sharing problems, and funding commitments.

Both major and non-major programs had approximately the same amount of internal and external funding support and cost estimating problems. It appears that major programs had a greater variance in the planned to actual R&D costs and that non-major programs had a greater variance in the planned to actual production costs.

Internal Environment - Managers of major programs believed that they were subjected to more complex oversight requirements and coordination problems and that they had more special controls placed on them than did managers of non-major programs. They felt that they were given less joint authority to make trade-offs between cost, schedule, performance, and supportability, identify funding needs, and control the funds allocated. They also felt that they had less joint authority to determine and control hardware and software configurations

## TABLE D.2-4
## EXECUTION FACTORS

| | Major Programs | All Programs | Non-Major Programs |
|---|---|---|---|
| **FUNDING** | | | |
| Cost Sharing Stability Index | 62% | 69% | 74% |
| Cost Sharing Problems | 35% | 34% | 32% |
| Funding Commitment, Lead | 6.9 | 7.0 | 7.0 |
| Funding Commitment, Service B | 6.3 | 6.8 | 7.1 |
| Funding Commitment, Service C | 6.1 | 6.2 | 6.3 |
| External Funding Support | 7.2 | 7.5 | 7.7 |
| Internal Funding Support, Lead | 6.4 | 6.5 | 6.5 |
| Internal Funding Support, Service B | 6.3 | 6.5 | 6.7 |
| Internal Funding Support. Service C | 6.4 | 6.0 | 5.7 |
| 3-Yr R&D Cost Turbulence | 49.9 | 41.9 | 34.4 |
| 5-Yr R&D Cost Turbulence | 114.1 | 100.5 | 88.9 |
| 3-Yr Production Funding Instability | 20.0 | 24.8 | 31.5 |
| 5-Yr Production Funding Instability | 89.7 | 108.0 | 132.8 |
| Cost Estimating Problems | 13% | 13% | 13% |
| **INTERNAL ENVIRONMENT** | | | |
| Manning Levels, Lead | 8.7 | 8.4 | 8.1 |
| Manning Levels, Service B | 6.5 | 6.7 | 6.9 |
| Manning Levels, Service C | 5.0 | 5.6 | 6.4 |
| Program Manager Authority | 7.4 | 7.5 | 7.7 |
| Program Manager Limitations | 7.7 | 7.9 | 8.1 |
| Oversight Reporting | 6.7 | 7.5 | 8.1 |
| **EFFECTIVENESS** | | | |
| Integrated Plan Execution Effectiveness | 8.3 | 7.8 | 7.5 |
| Charter Effectiveness | 7.1 | 7.4 | 7.6 |
| Organization Effectiveness | 7.4 | 7.2 | 7.0 |
| Acquisition Strategy Effectiveness | 7.0 | 7.0 | 7.2 |
| Organization Approrpiateness | 7.2 | 7.1 | 7.0 |
| Cost Sharing Helped | 64% | 73% | 80% |
| Configuration Mgt (Stability) | 6.8 | 7.2 | 7.5 |
| Technical Req Resolution, Current | 3.2 | 3.4 | 3.5 |
| Charter Need | 72% | 63% | 56% |

# TABLE D.4-2

## SELECTION AND INITIATION FACTORS

| | AIRCRAFT | $C^3I$ NAV | COMPONENT/ SUBSYSTEM | GROUND COMBAT SUPPORT | GROUND COMBAT VEHICLES | MISSILES | MUNITIONS | SHIP | SPACE | TECHNOLOGY | HAND WEAPONS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SCHEDULE AND COMMONALITY FACTORS** | | | | | | | | | | | |
| Timelinesa Similarity Index | 4.3 | 1.1 | 0.9 | 1.0 | 0.40 | 0.86 | 0.78 | 0.0 | 0.50 | 0.0 | 0.0 |
| Timelinesa Compromiae Index, Lead | 0.0 | 0.3 | 0.5 | 0.3 | 0.0 | 0.08 | 0.0 | 0.0 | 0.0 | 0.33 | 0.0 |
| Timeliness Compromise Index, Service 8 | 0.0 | 0.5 | 0.6 | 0.3 | 0.0 | 0.09 | 0.0 | 0.0 | 0.0 | 0.33 | 0.0 |
| Timeliness Compromise Index, Service C | 0.0 | 0.4 | 0.2 | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 |
| Commonality Percentage | 70% | 90% | 80% | 90% | 95% | 81% | 99% | 100% | 81% | | 100% |
| Commonality of Specifications | 67% | 84% | 80% | 93% | 68% | 78% | 73% | 100% | 87% | | 100% |
| Roles & Missions Differences | 50% | 6% | 0 | 0 | 0 | 7% | 0 | 0 | 0 | 0 | 0 |
| **TECHNICAL FACTORS** | | | | | | | | | | | |
| Technical Complexity | 7.2 | 7.3 | 4.5 | 2.3 | 2.7 | 7.1 | 4.0 | 3.0 | 6.8 | 8.0 | 2.7 |
| Technical Requirements Similarity Index | 0.5 | 0.8 | 0.8 | 0.9 | 0.66 | 0.81 | 0.96 | 0.95 | 0.76 | 0.90 | 0.99 |
| Technical Requirements Reaolution, Initial | 3.0 | 3.2 | 3.3 | 4.3 | 2.6 | 3.7 | 4.8 | 4.0 | 3.8 | 4.5 | 4.3 |
| Technical Requirements Compromise, Lead | 3.2 | 3.4 | 3.7 | 4.5 | 3.0 | 4.2 | 2.8 | 4.0 | 3.8 | 4.0 | 4.7 |
| Technical Requirements Compromise, Service 8 | 2.6 | 3.5 | 3.3 | 4.3 | 2.8 | 4.3 | 4.8 | 4.0 | 4.0 | 4.5 | 4.3 |
| Technical Requirements Compromise, Service C | 3.0 | 3.4 | 3.0 | 4.7 | 4.5 | | | | 4.0 | 4.5 | 5.0 |
| **INTER- AND INTRA-SERVICE AGREEMENTS** | | | | | | | | | | | |
| Charter Existence | 40% | 70% | 40% | 30% | 75% | 80% | 100% | 0 | 50% | 75% | 100% |
| Cost 8enefit Analysis | 20% | 19% | 24% | 0 | 0 | 0 | 0 | 0 | 25% | 0 | 0 |
| Coat Sharing Agreement | 1.4 | 1.5 | 1.2 | 1.5 | 2.0 | 1.3 | 1.8 | | 1.0 | 1.3 | 2.0 |
| Memorandum of Agreement | 100% | 70% | 60% | 0 | 75% | 73% | 75% | 100% | 100% | 75% | 33% |
| Inter-Service Agreements | 2.8 | 6.8 | 6.0 | 6.0 | 8.3 | 7.0 | 8.0 | | 8.5 | 7.8 | 5.0 |
| Negotiation Level | 2.6 | 3.1 | 3.2 | 3.3 | 3.0 | 3.2 | 2.8 | 4.0 | 2.5 | 4.3 | 2.3 |
| **EXTERNAL FACTORS** | | | | | | | | | | | |
| External Selection for Jointness | 0.6 | 0.7 | 0.4 | 0.5 | 0.75 | 0.60 | 0.75 | 1.0 | 0.75 | 1.0 | 0.67 |
| Rationale Index for Jointness | 3.2 | 1.6 | 2.8 | 2.5 | 1.5 | 2.1 | 2.0 | 3.0 | 2.3 | 3.3 | 1.0 |
| 8asis for Selection of Lead Service | 3.0 | 3.8 | 3.2 | 4.0 | 1.5 | 4.1 | 3.3 | 4.0 | 2.8 | 4.7 | 1.7 |
| Designation of Lead Service | 2.8 | 2.8 | 3.0 | 3.5 | 2.5 | 2.5 | 2.5 | 3.0 | 2.0 | 2.0 | 2.3 |

TABLE D.4-3

NEGOTIATION LEVEL OF INTER-SERVICE AGREEMENTS

| TYPE OF PROGRAM | NEGOTIATION LEVEL | PERCENTAGE |
|---|---|---|
| Aircraft | Service Secretariate | 40% |
| Ground Combat Support | Service Headquarters | 50% |
| $C^3I$ Navigational Equip. | Service Headquarters | 33% |
| Component Subsystems | Service Headquarters | 31% |
| Ground Combat Vehicles | Service Headquarters | 50% |
| | Product Division | 50% |
| Missiles | Service Headquarters | 43% |
| Munitions | Service headquarters | 40% |
| | Product Division | 40% |
| Space | Service Headquarters | 50% |
| Hand Weapons | Service Headquarters | 67% |
| Technology | Other | 50% |

External Factors - The rationale behind a decision to go joint was interoperability, cost savings, interoperability and cost savings (both), or other. Half of the commodities cited cost savings and the other half cited both interoperability and cost savings as the prime reason for jointness.

Once a program was selected to become joint, a lead Service was designated. In every commodity category, OSD was the primary organization responsible for selecting the lead Service. Aircraft, $C^3I$ navigational equipment, component/subsystems, ground combat support, missiles, munitions, and technology programs all cited technological capability due to previous efforts as the major reason for the selection of the lead Service. Ground combat vehicles had a lead Service chosen because of either the greatest need or the largest dollar buy. Space programs cited prior agreements and hand weapons cited the largest dollar buy as the major reason for the selection of the lead Service.

and manage program office military and civilian personnel than did the non-major program managers. Program managers of major programs felt that they had a higher level of authority when the lead was designated by the Services rather than OSD, whereas program managers of non-major programs felt that they had a higher level of authority when the lead was designated by the JLCs, OSD, or the Services, in that order. Regardless of their perception of authority, there was a high correlation between the program manager's authority, cost sharing stability, and internal funding stability.

Overall, major program managers were better able to control cost growth and schedule slippage; 11 percent, 11 percent, and 6 percent compounded growth for R&D, production, and schedule slippages versus 29 percent, 8 percent, and 13 percent respectively for non-major programs. Looking at program manager authority in greater depth, the data in Figures D.2-6 and D.2-7 indicate that whether a program manager's authority was actual or perceived, those with greater than average authority were better able to control the rate of cost growth and maintain better configuration management control. Managers of major programs with an authority level below the mean had a 20 percent compound rate of growth for research and development cost; those with an authority level above the mean had a 2 percent compound rate of growth for research and development costs. For those above the mean in authority the rate of production cost growth was 15 percent (compounded) and for those below the mean it was 6 percent (compounded). The same relationship holds for non-major programs. Program managers who rated below the mean for authority had a 24 percent compound rate of R&D cost growth and a 16 percent compound rate of production cost growth. Those managers who rated above the mean for authority had a 3 percent and 1 percent rate of compound cost growth for R&D and production cost growth respectively.

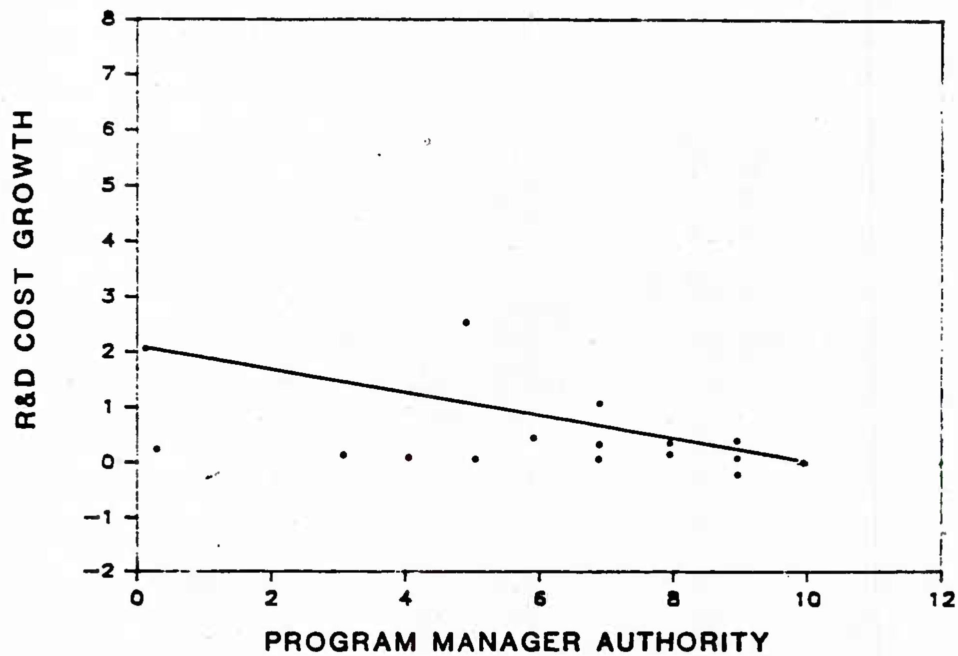


Figure D.2-6 Regression of Program Manager Authority and R&D Cost Growth

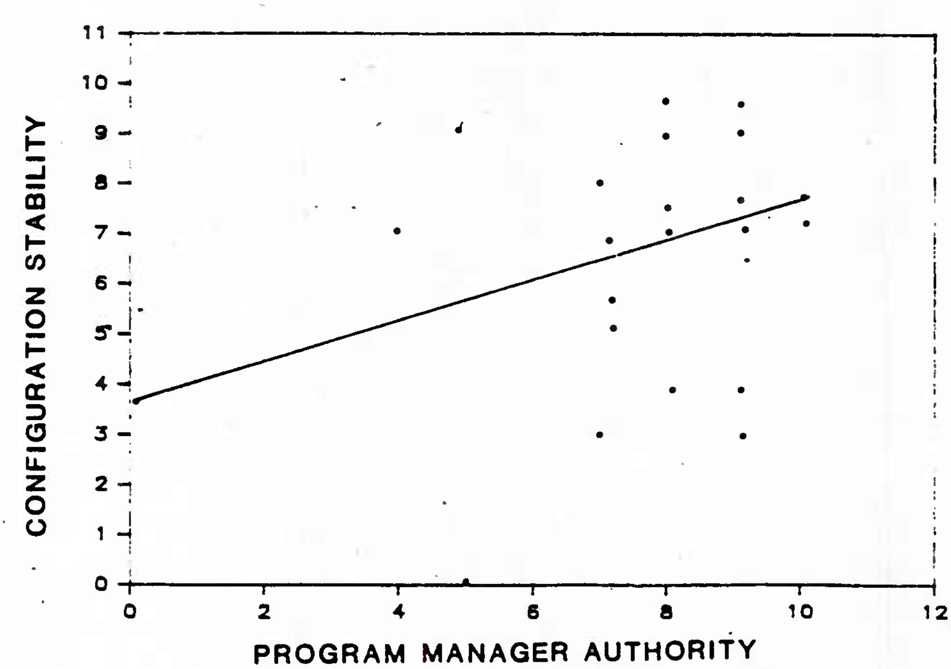


Figure D.2-7 Regression of Program Manager Authority and Configuration Stability

The manning levels were determined by comparing the number of personnel assigned to the number of personnel authorized. Some adjustments were made for factors such as lengthy vacancies, high program manager turnover rates, and adequacy of the authorizations which otherwise would not have been reflected. As one would expect, the manning levels for the lead Service are the highest and the manning levels for the third participating Service are the lowest. When comparing manning levels and program manager's authority, the manning level of the lead Service was the same regardless of the level of the program manager's authority. The authority level became more important in the staffing by the participating Services. Program managers with greater authority in both major and non-major programs had higher than average participating Service manning levels. The reverse is true for program manager's with lower than average authority.

Effectiveness - The majority of both major and non-major programs had a charter, 64 percent and 63 percent respectively. Of those programs that had charters, 71 percent of the major and 76 percent of the non-major program managers stated that the charter was necessary and effective. Forty-two percent of the major programs and 13 percent of the non-major programs without charters had program managers who stated that it would be beneficial to have a charter.

As illustrated in Figure D.2-8, the majority of the major programs were organized in JPOs (73 percent major and 9 percent non-major). The majority of the non-major programs were organized as a single Service program office with commitment to buy from the participating Service (61 percent non-major and 21 percent major).

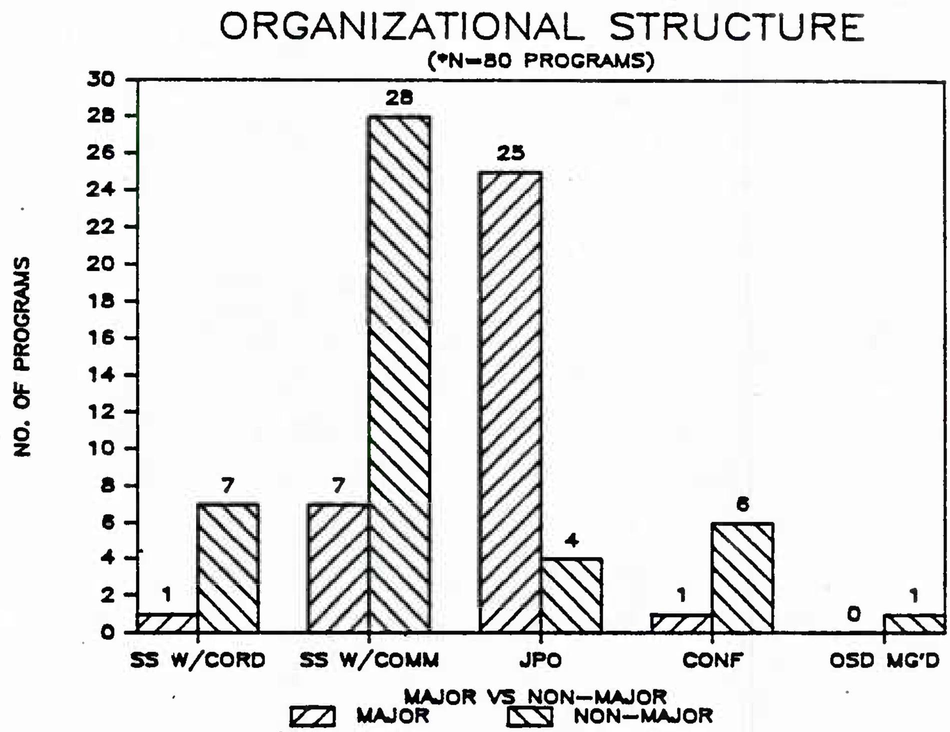


Figure D.2-8 Organizational Structure for Major and Non-Major Programs

The managers of major programs rated their organizational structures as more appropriate and more effective than did the managers of non-major programs. Sixty-four percent of the major JPO managers rated their organizational structures as both an effective and an appropriate form of organization. Twenty-eight percent of single Service with commitment programs rated their organizational structure as effective and 14 percent of the programs managers for these programs rated their organizational structure as the most appropriate form of organization.

Seventy-five percent of the managers of non-major JPOs rated their organizational structures as both an effective and an appropriate form of organization. Forty-three

percent of the managers of organizations structured as single Service with commitment rated their structure as effective. Thirty-nine percent of these program managers rated their organization as the most appropriate form. Confederated programs were considered to have been the most appropriate organizational form by 67 percent of their managers and as effective by 50 percent. Single Service with coordination programs were rated by 84 percent of their managers as both an inappropriate and an ineffective organizational structure.

The majority of the programs rated above the mean for organizational effectiveness and appropriateness were also above the mean for program manager authority.

### D.2.4 Success Factors

The success of a program was determined by the following criteria:

- Degree of technical requirements compromise required to make the end item acceptable to all Services involved
- Program dollars spent on common versus Service-unique items
- Trauma involved due to the resolution of technical requirements, Service turf problems, funding perturbations, manning problems, or the withdrawal of a participant
- Control of cost and schedule growth
- Attainment of the desired performance and supportability goals.

The above criteria were further subdivided into initiation and execution success. If a program was able to

resolve initial problems (those caused because the program became joint) in a reasonable and timely manner, the program scored a high initiation success rating. If a program was able to control cost and schedule growth, had limited funding perturbations, and no Service withdrew from the program, it scored a high execution success rating.

As seen from Table D.2-5, major programs had on average a lesser degree of selection, initiation, and execution harmony than did non-major programs. From this, it might be expected that the major programs would have a lesser degree of initiation and execution success. This, however, was not the case. Major programs were able to overcome the lack of harmony experienced in selection, initiation, and execution, and averaged nearly the level of execution success as non-major programs.

TABLE D.2-5

SUCCESS FACTORS

| | Major Programs | All Programs | Non-Major Programs |
|---|---|---|---|
| Commonality Percentage | 80% | 87% | 92% |
| Technical Requirements Compromise, Lead | 3.47 | 3.79 | 4.02 |
| Technical Requirements Compromise, Service B | 3.48 | 3.66 | 3.79 |
| Compound Rate of R&D Cost Growth | 0.11 | 0.36 | 0.62 |
| Compound Rate of Production Cost Growth | 0.11 | 0.10 | 0.08 |
| Compound Rate of Schedule Slippage | 0.06 | 0.40 | 0.73 |
| Average Supportability Rate | 1.05 | 1.20 | 1.38 |
| Average Rate of Performance | 1.08 | 1.08 | 1.10 |
| Selection Harmony | 2.74 | 3.00 | 3.20 |
| Initiation Harmony | 3.48 | 3.58 | 3.64 |
| Execution Harmony | 2.64 | 2.66 | 2.70 |
| Initiation Success | 2.70 | 3.00 | 3.20 |
| Execution Success | 2.42 | 2.40 | 2.40 |

Two factors which correlated well with the success of a program are shown in Figures D.2-9, D.2-10, and D.2-11.

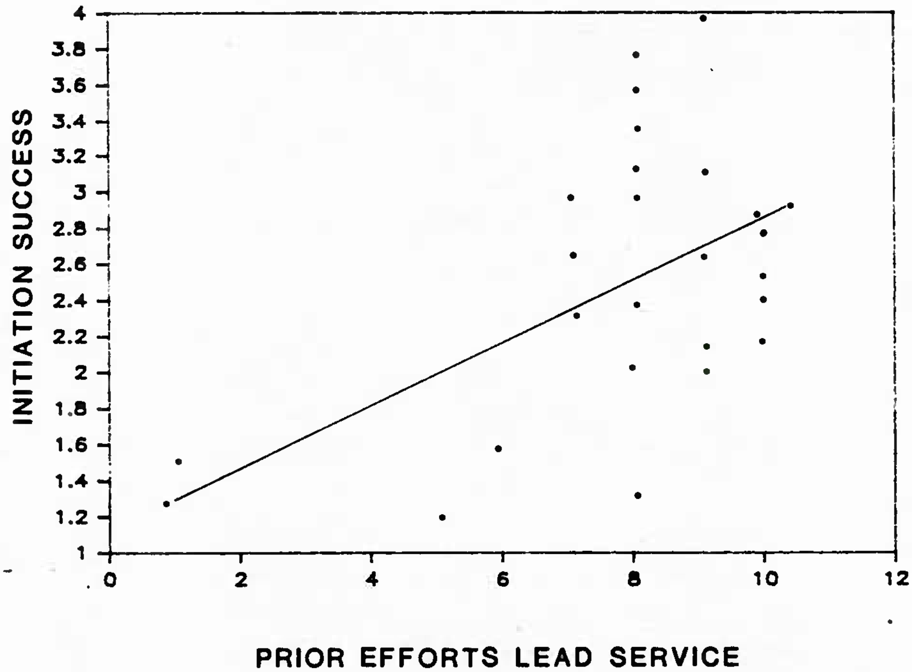


Figure D.2-9 Regression of Initiation Success and Prior Effort Lead Service

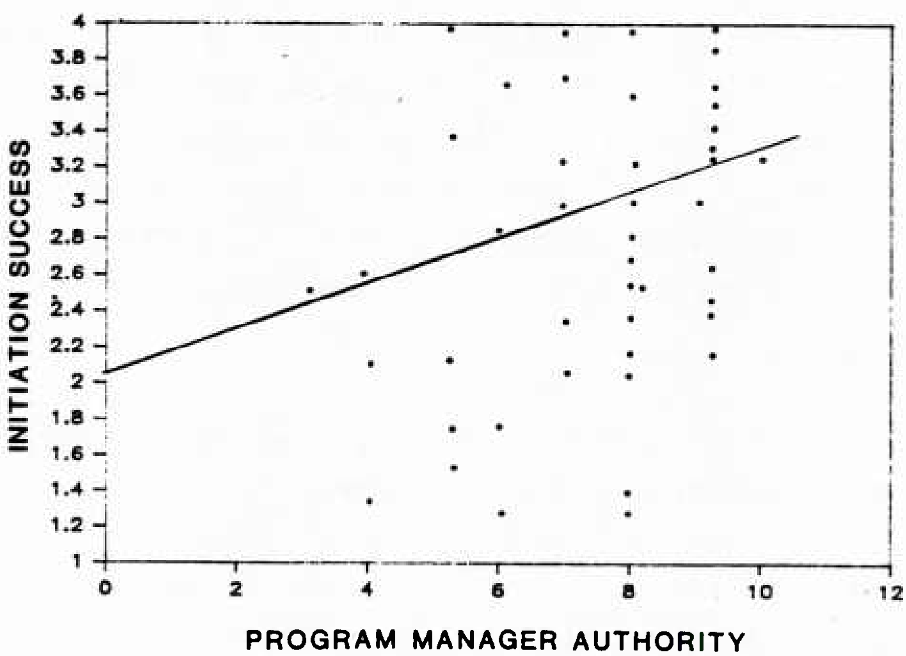


Figure D.2-10 Regression of Initiation Success and Program Manager Authority

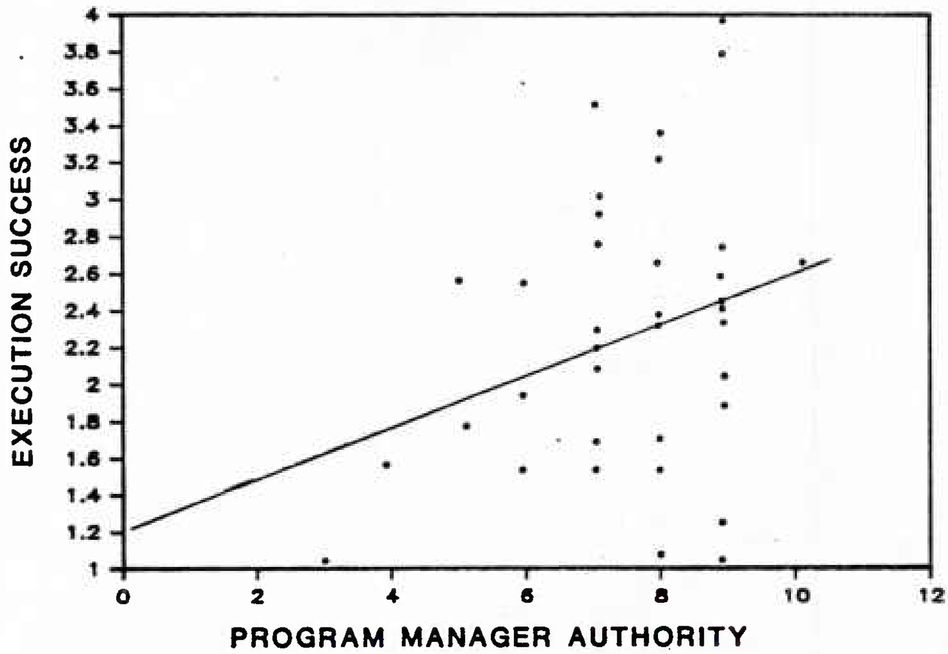


Figure D.2-11 Regression of Execution Success and Program Manager Authority

The amount of experience acquired by the lead from an ongoing program prior to becoming joint correlated positively with initiation success. The level of program manager authority also correlated well with initiation success and with how well the program met cost and schedule plans. The greater the program manager authority, the greater the probability of success.

Figures D.2-12 and D.2-13 indicate that there is a positive linear relationship between what phase a program is in when it becomes joint and the degree of selection and initiation harmony experienced by the program. The younger the program (i.e., the earlier it is in its acquisition cycle), the greater the reduction in the amount of resistance, delays, and withdrawals a program experienced during the early stages of jointness.

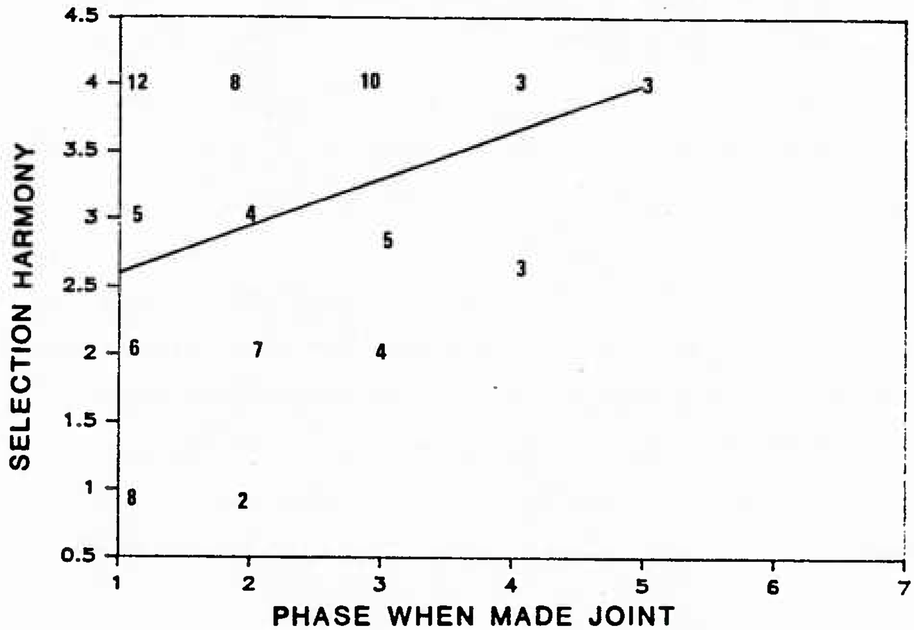


Figure D.2-12 Regression of Phase When Joint and Selection Harmony

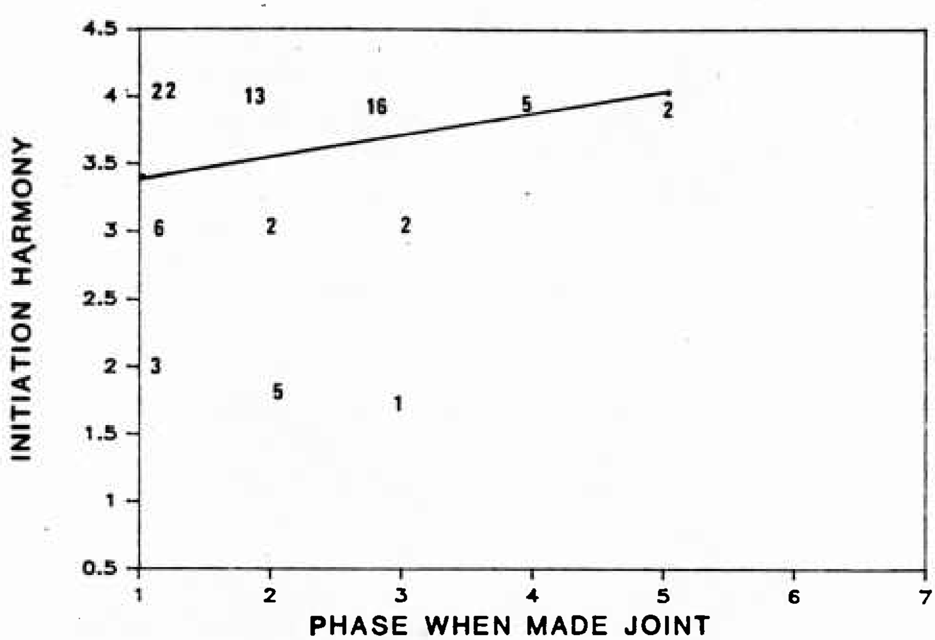


Figure D.2-13 Regression of Phase When Joint and Initiation Harmony

Acquisition strategy and manning levels are two factors that correlated with the rate of R&D cost growth (Figures D.2-14 and D.2-15). The better a program's acquisition strategy and the closer the lead Service came to meeting its planned manning levels, the less the potential for R&D cost growth.

Figures D.2-16 and D.2-17 indicate that a major program's R&D cost growth is related to how much an ongoing effort the lead Service had prior to becoming joint and how strongly the lead Service was committed to funding the program. The greater the prior effort and the greater the funding commitment, the less the potential for R&D cost growth.

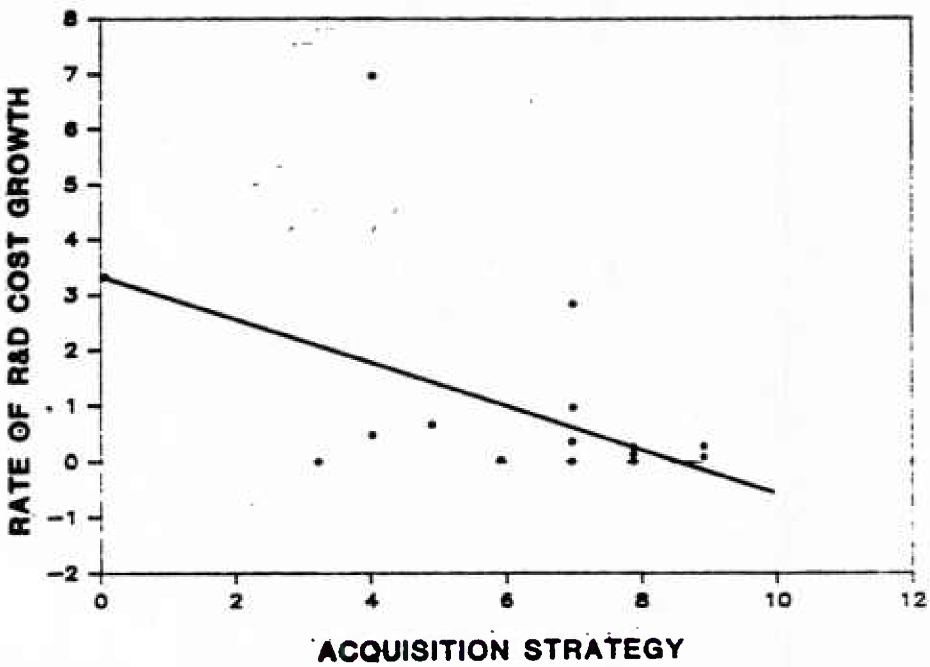


Figure D.2-14 Regression of Acquisition Strategy and R&D Cost Growth

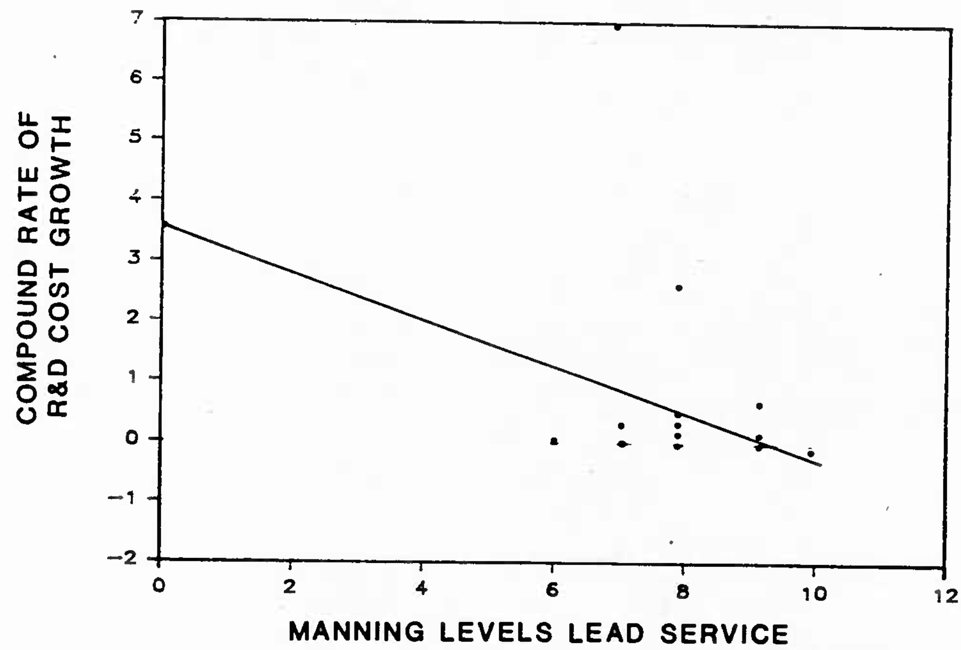


Figure D.2-15 Regression of Lead Manning Levels and R&D Cost Growth

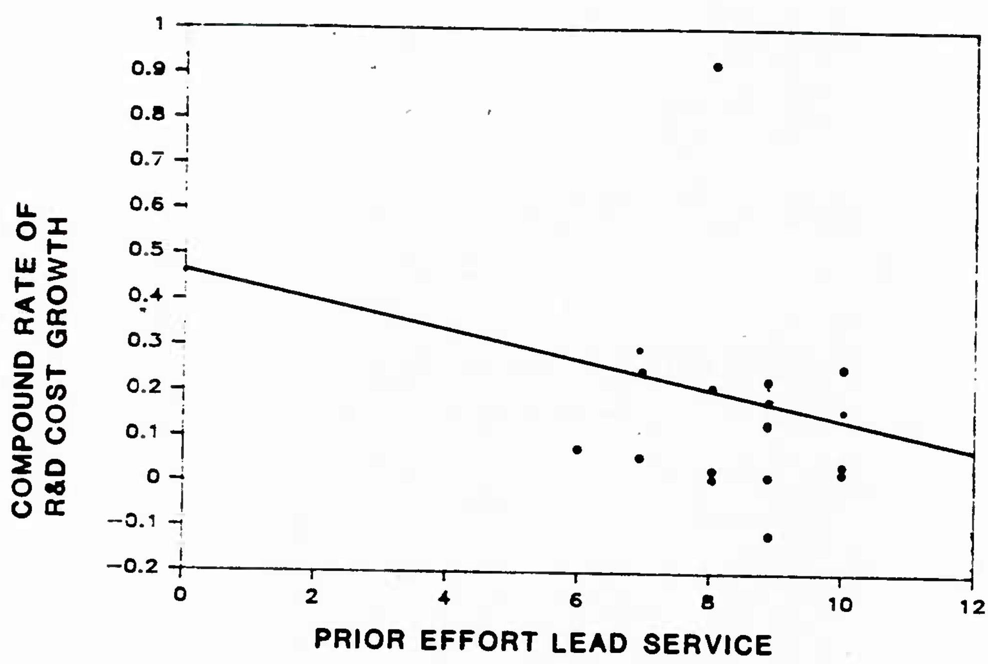


Figure D.2-16 Regression of Prior Effort of the Lead Service and R&D Cost Growth

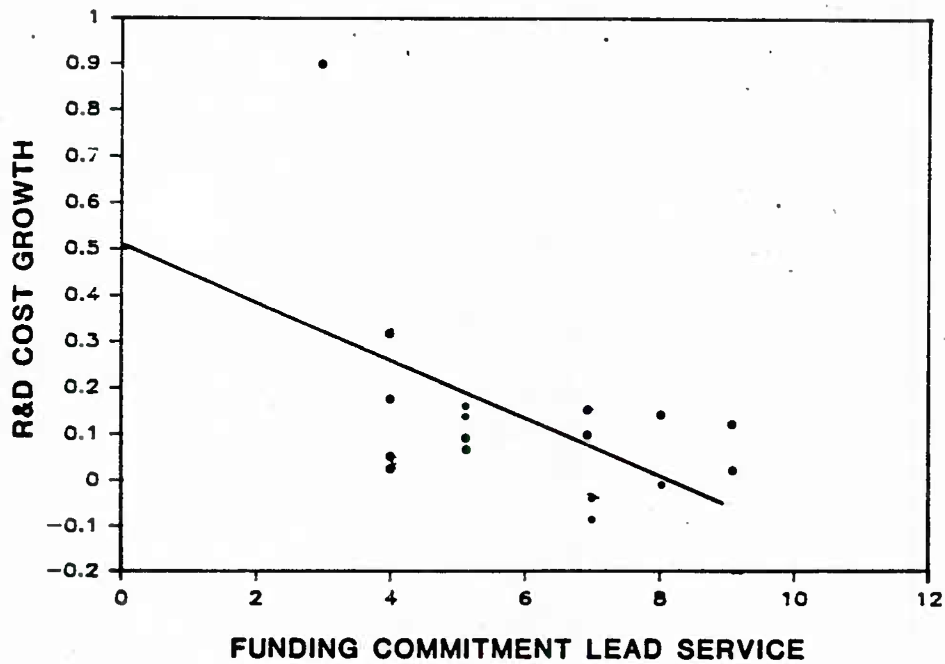


Figure D.2-17 Regression of Lead Service Funding Commitment and R&D Cost Growth

## D.3 ORGANIZATION

As illustrated in Figures D.3-1 through D.3-5, the most common organizational structure of the 80 programs analyzed was the Single Service with Commitment (SS W/COM, 44 percent), followed by the Joint Program Office (JPO, 36 percent), Single Service with Coordination (SS W/CORD, 10 percent), Confederated (9 percent), and OSD-Managed (1 percent). There will be little discussion about the OSD-Managed program as there is only one such program in the data base.

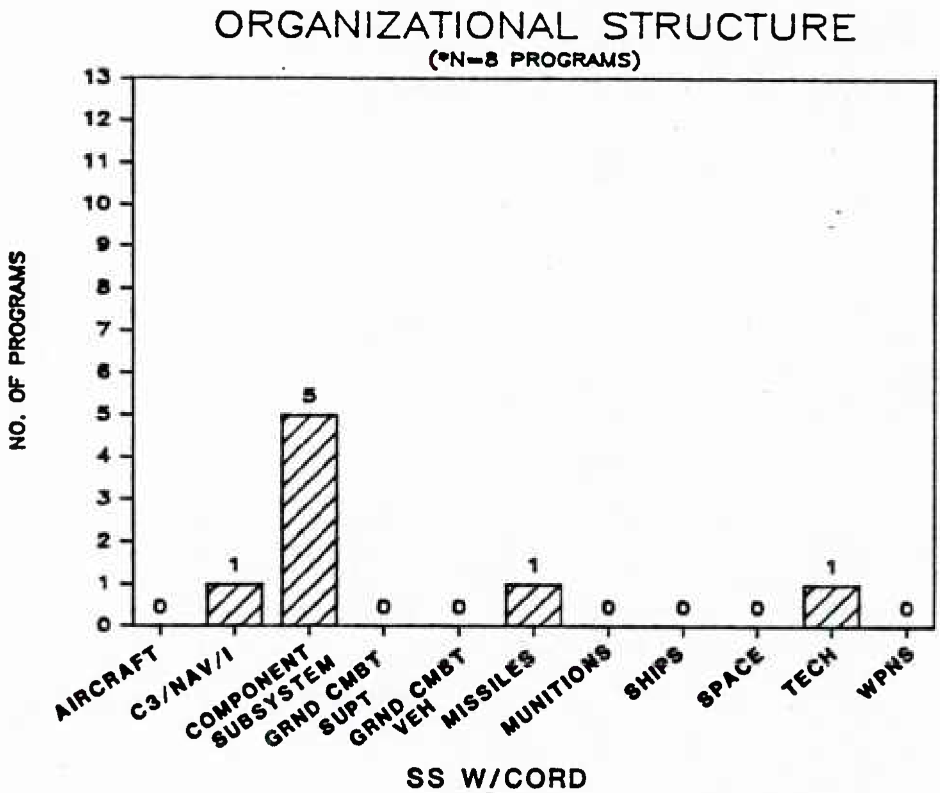


Figure D.3-1 Programs Organized as Single Service with Coordination

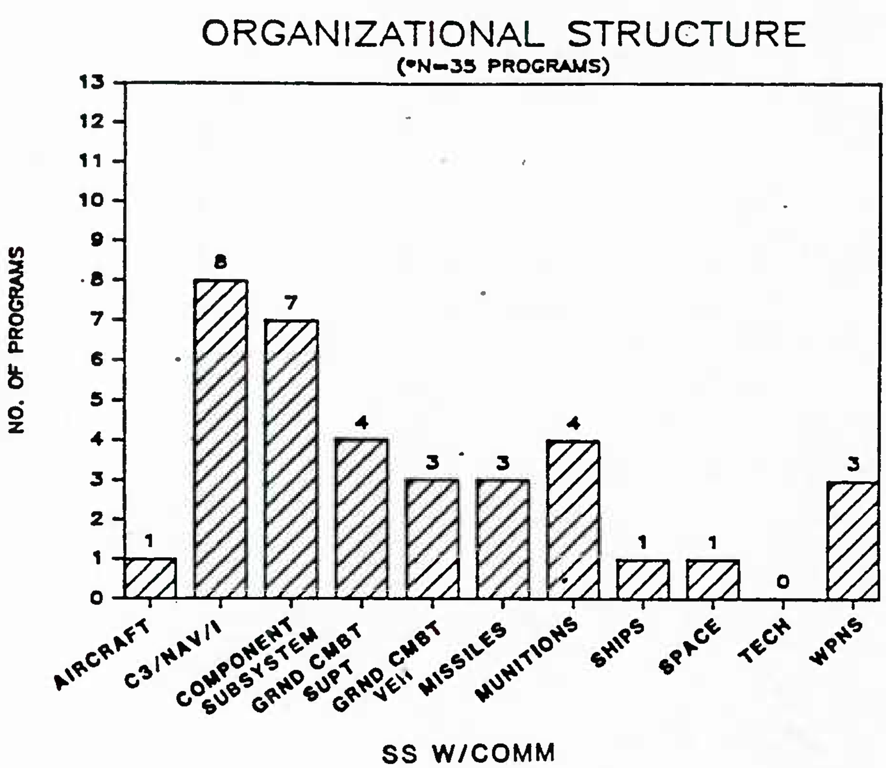


Figure D.3-2 Programs Organized as Single Service with Commitment to Buy

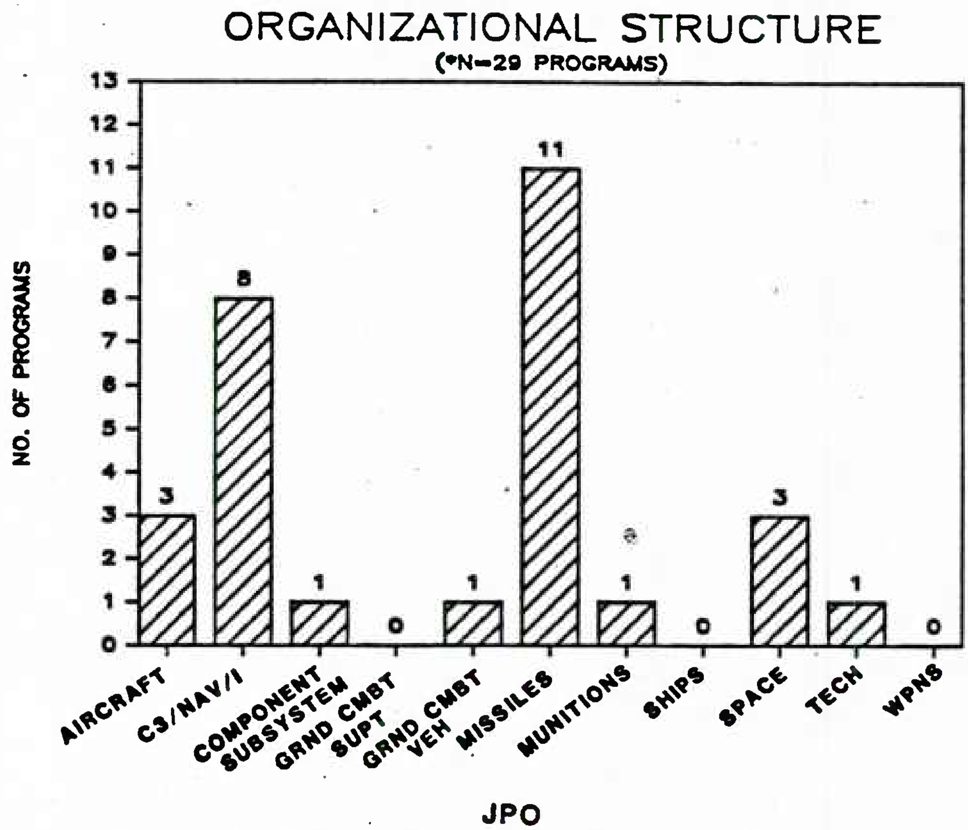


Figure D.3-3 Programs Organized as a Joint Program Office

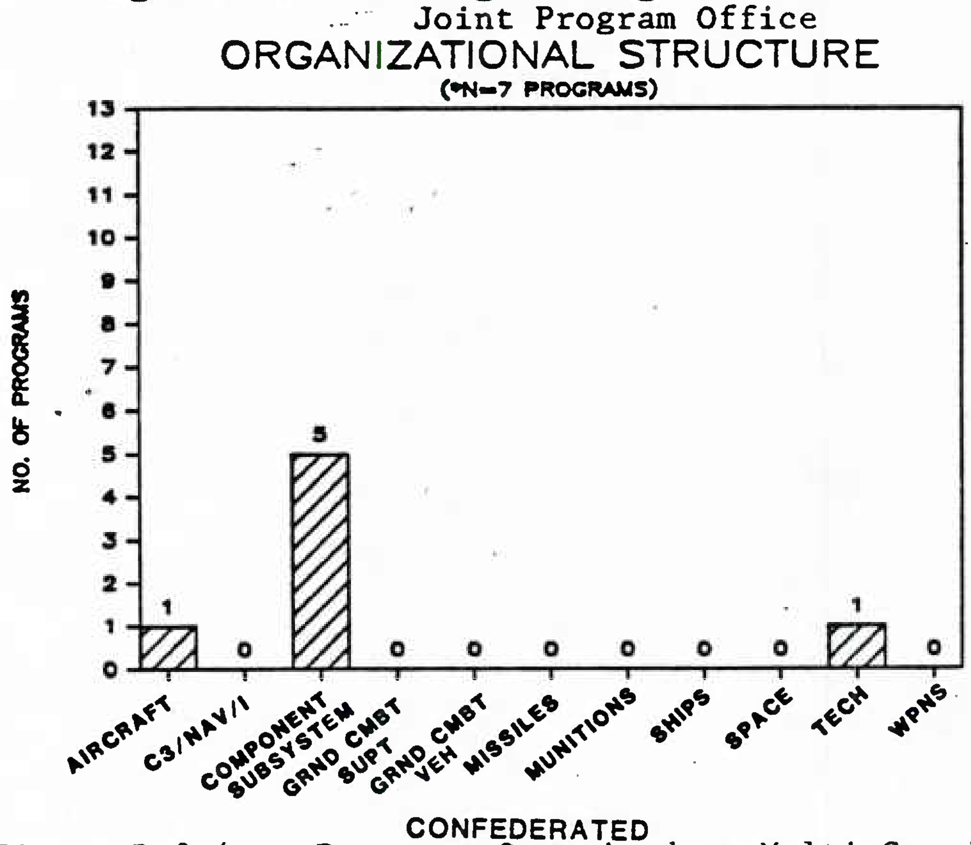


Figure D.3-4 Programs Organized as Multi-Service or Confederated

### D.3.1 Pre-Joint Environment

Prior to becoming a joint program, the lead Service (regardless of the organizational structure) had a higher level of pre-joint program involvement than did the other Service participants. As shown in Table D.3-1, only the lead Services of JPOs and confederated programs had a level of involvement that was above the mean of all programs.

TABLE D.3-1
PRE-JOINT ENVIRONMENT FACTORS

| | SS W/ COORD | SS W/ COMMITMENT | JPO | CONFEDERATED | OSD-MANAGED | ALL PROGRAMS |
|---|---|---|---|---|---|---|
| Prior Effort, Lead | 6.1 | 7.4 | 8.0 | 8.3 | 4.0 | 7.5 |
| Prior Effort, Service B | 4.3 | 4.9 | 6.7 | 6.3 | 3.0 | 5.5 |
| Prior Effort, Service C | 5.2 | 4.3 | 3.1 | 7.0 | 3.0 | 4.2 |
| Point in Acquisition Cycle, Lead | 1.6 | 2.8 | 2.2 | 3.2 | 1.0 | |
| Point in Acquisition Cycle, Service B | 1.3 | 1.6 | 2.0 | 1.5 | 1.0 | |
| Point in Acquisition Cycle, Service C | 1.6 | 1.7 | 2.0 | 2.0 | 1.0 | |
| Documented Need, Lead | 50% | 80% | 90% | 80% | 0.0 | |
| Documented Need, Service B | 40% | 60% | 80% | 80% | 0.0 | |
| Documented Need, Service C | 60% | 30% | 60% | 100% | 0.0 | |
| Priority of Need, Lead | 1.8 | 2.1 | 1.7 | 1.8 | 1.0 | |
| Priority of Need, Service B | 2.5 | 1.9 | 1.8 | 2.0 | 3.0 | |
| Priority of Need, Service C | 2.3 | 2.3 | 2.0 | 1.0 | 3.0 | |

### D.3.2 Selection and Initiation Factors

Schedule and Commonality Factors - The timeliness similarity index is a measure of the yearly difference between two Services' needed IOC dates. As indicated in Table D.3-2, the participants of JPOs and SS W/COM organizations acknowledged that there were IOC date differences and anticipated a one-to-three month IOC date compromise due to the merger of the independent programs. The participants of SS W/CORD and OSD-managed programs did not indicate any IOC date differences nor IOC date compromises. Confederated program participants had similar needed IOC dates prior to becoming joint.

## TABLE D.3-2
## SELECTION AND INITIATION FACTORS

| | SS W/ COORD | SS W/ COMMITMENT | JPO | CONFEDERATED | OSD-MANAGED | ALL PROGRAMS |
|---|---|---|---|---|---|---|
| **SCHEDULE AND COMMONALITY FACTORS** | | | | | | |
| Timeliness Similarity Index | 0 | 6 Mo | 1 Yr 1 Mo | 0 | 0 | 1 Yr |
| Timeliness Compromise Index, Lead | 0 | 3 Mo | 1 Mo | 3 Mo | 0 | 3 Mo |
| Timeliness Compromise Index, Service B | 0 | 2 Mo | 2 Mo | 3 Mo | 0 | 3 Mo |
| Timeliness Compromise Index, Service C | 0 | 1 Mo | 3 Mo | 0 | 0 | 2 Mo |
| Commonality Percentage | 96% | 96% | 79% | 54% | | 87% |
| Commonality of Specifications | 95% | 84% | 76% | 70% | | 81% |
| Roles & Missions Differences | 0 | 0 | 10% | 0 | 0 | 6% |
| **TECHNICAL FACTORS** | | | | | | |
| Technical Complexity | 7.2 | 4.1 | 7.4 | 5.5 | 8.0 | 58% |
| Technical Requirements Similarity Index | 77% | 88% | 75% | 75% | 80% | 79% |
| Technical Requirements Resolution, Initial | 2.5 | 4.0 | 3.1 | 3.8 | 4.0 | 3.5 |
| Technical Requirements Compromise, Lead | 3.4 | 4.1 | 3.5 | 4.0 | 3.0 | 3.8 |
| Technical Requirements Compromise, Service B | 2.5 | 4.1 | 3.5 | 4.0 | 4.0 | 3.7 |
| Technical Requirements Compromise, Service C | 2.0 | 4.2 | 3.3 | 3.0 | 4.0 | 3.8 |
| **INTER- AND INTRA-SERVICE AGREEMENTS** | | | | | | |
| Charter Existence | 60% | 58% | 79% | 0.0 | 100% | |
| Cost Benefit Analysis | 0 | 12% | 14% | 17% | | 12% |
| Cost Sharing Agreement | 1.0 | 1.5 | 1.3 | 2.0 | 1.0 | |
| Memorandum of Agreement | 43% | 58% | 86% | 83% | 0 | 68% |
| Inter-Service Agreements | 5.2 | 6.6 | 7.6 | 6.8 | 5.0 | 6.8 |
| Negotiation Level | 3.8 | 2.8 | 3.0 | 4.3 | 4.0 | 3.1 |
| **EXTERNAL FACTORS** | | | | | | |
| External Selection for Jointness | 63% | 60% | 76% | 14% | 100% | |
| Rationale Index for Jointness | 2.4 | 2.1 | 2.2 | 3.2 | 3.0 | |
| Basis for Selection of Lead Service | 4.3 | 3.2 | 3.5 | 2.8 | 6.0 | |
| Designation of Lead Service | 2.8 | 2.9 | 2.3 | 3.8 | 2.0 | |

The merger of the independent programs into an SS W/COM program caused no difference in the roles and missions of that class of programs. They were able, therefore, to specify a product which was 84 percent common to all participants and spend 96 percent of the total program dollars on common equipment. However, it must be noted that these programs were the least technically complex of all classes of programs (29 percent below the average).

SS W/CORD programs are the only class of joint programs which had a high degree of technical complexity, experienced no roles and missions differences as a result of jointness, and were able to develop products with a high degree of commonality (95 percent common).

The class of programs organized as JPOs experienced changes in their end-item roles and missions requirements as a result of having become "joint." Since each participant was less willing to compromise on the capabilities of the system being developed, the products were only 76 percent common to all Services. It must be recognized that this is the most technically complex group of programs (22 percent greater than the average) and resolution of differences could only occur if it entailed minimal compromise in capabilities. It must also be remembered that these are figures for a class of programs and not for individual programs.

The multi-Service or Confederated group of programs are of low technical complexity (as compared to the SS W/CORD, the JPO, and the OSD-managed programs) and their mergers did not cause any differences in their end-item roles and missions capabilities. This group of programs had the least similarity in technical requirements. It was also the group least able to specify a product with a high degree of commonality, which

resulted in 46 percent of total program dollars being spent on Service-unique items.

Technical Factors - As a class of programs, the most technically complex are those organized as JPOs followed by SS W/CORDs, 22 percent and 19 percent above the mean respectively. Both the Confederated and the SS W/COM class of programs are of relatively low technical complexity, 5 percent and 29 percent below the mean respectively. The one OSD-managed program is 28 percent above the mean of the technical complexity of all programs.

The technical requirements compromise factor assesses the compromise that occurred as a result of having become a joint program and having merged the technical requirements of all participants. The group of programs organized as SS W/CORDs, the second most technically complex group, had the most difficulty resolving their requirements differences. The participating Services (B and C) made major compromises and the lead Services lesser compromises in order to resolve their significant differences and obtain an acceptable end item. Not surprisingly, the least technically complex groups, SS W/COM and Confederated programs, had the least amount of difficulty resolving their requirements differences.

Interservice Agreements - Programs organized as JPOs were the most likely class of programs to have a charter (79 percent of the sample) and use Memoranda of Agreement (MOA) to document their inter-Service agreements (86 percent of the sample). Forty-five percent of these agreements were negotiated at the Service headquarters level or higher and 38 percent at the JLC or product division level; the other 15 percent fell into the category of other.

None of the confederated programs had charters. Eighty-three percent of the Confederated programs used MOAs to document their inter-Service agreements. Thirty-three percent of these agreements were negotiated at the product division level, 17 percent by the JLCs, and 50 percent fell into the category of other.

Fifty-eight percent of all SS W/COM programs had both a charter and MOAs. The majority (49 percent) of the agreements were negotiated at the Service headquarters level, 24 percent were negotiated by the product divisions, 13 percent by the JLC, 6 percent by the Service Secretariats, and 15 percent were in the category of other.

Sixty percent of the SS W/CORD programs had a charter and 43 percent of them used MOAs. These agreements were most often negotiated by the Service headquarters (25 percent) or the JLCs (25 percent); 50 percent of the agreements negotiated were in the category of other.

The one OSD-managed program did have a charter, but did not use MOAs.

External Factors - The rationale behind a decision to go joint was: interoperability, cost savings, both interoperability and cost savings, or other. For this study, interoperability was used in the context of having the ability to operate in a cooperative manner for a joint warfighting capability. Every class of programs listed cost savings as the main reason for becoming joint. Both interoperability and cost savings was the second most common reason for all classes of programs, with the exception of the Confederated programs.

Five Confederated programs listed cost savings as the rationale for jointness, one listed standardization (other), and one was undetermined.

Once a program was slated to become joint, a lead Service was designated for one of the following reasons:

- Greatest need
- Most dollars, i.e., largest buy
- Ongoing effort/technical capability
- Prior agreement.

All classes of programs listed the ongoing effort as the prime reason for selecting the lead Service. The Service with the gretest pre-joint program effort, therefore, became the lead Service. Table D.3-3 shows the rationale each class of programs used to select the lead Service.

### D.3.3 Execution Factors

Effectiveness - As indicated in Table D.3-4, the JPO was rated as the most appropriate and the most effective of all the organizational structures, followed by the Confederated, SS W/COM, and the SS W/ CORD organizations.

Sixty-six percent of the programs organized as JPOs and 63 percent of the Confederated programs rated their organizational structures as both appropriate and effective. Thirty-eight percent of the SS W/CORD and the SS W/COM programs rated their organizational structures as both appropriate and effective. The OSD program's organizational structure was rated as both effective and appropriate.

TABLE D.3-3

DESIGNATION OF LEAD SERVICE

| | |
|---|---|
| | **SS W/CORD** |
| 63% | Ongoing Effort/Technical Capability |
| 25% | Other |
| 12% | Most Dollars/Largest Buy |
| | **JPO** |
| 52% | Ongoing Effort/Technical Capability |
| 17% | Greatest Need |
| 14% | Other |
| 10% | Most Dollars/Largest Buy |
| 7% | Prior Agreement |
| | **SS W/COM** |
| 57% | Ongoing Effort/Technical Capability |
| 17% | Most Dollars/Largest Buy |
| 14% | Prior Agreement |
| 12% | Greatest Need |
| | **CONFEDERATED** |
| 50% | Ongoing Effort/Technical Capability |
| 25% | Most Dollars/Largest Buy |
| 25% | Greatest Need |
| | **OSD** |
| 100%* | Other |

*Based on only one program.

## TABLE D.3-4
## EXECUTION FACTORS

| | SS W/ COORD | SS W/ COMMITMENT | JPO | CONFEDERATED | OSD-MANAGED | ALL PROGRAMS |
|---|---|---|---|---|---|---|
| **FUNDING** | | | | | | |
| Cost Sharing Stability Index | 63% | 74% | 63% | 68% | 100% | 69% |
| Cost Sharing Problems | 50% | 25% | 41% | 25% | 100% | 34% |
| Funding Commitment, Lead | 7.6 | 6.7 | 6.0 | 7.8 | 9.0 | 7.0 |
| Funding Commitment, Service B | 2.3 | 6.9 | 6.9 | 6.2 | 9.0 | 6.8 |
| Funding Commitment, Service C | | 6.4 | 6.0 | 4.0 | 9.0 | 6.2 |
| External Funding Support | 8.2 | 7.1 | 7.6 | 8.2 | 10.0 | 7.5 |
| Internal Funding Support, Lead | 7.4 | 6.3 | 6.4 | 8.0 | 4.0 | 6.5 |
| Internal Funding Support, Service B | 1.0 | 6.8 | 6.5 | 7.7 | 4.0 | 6.5 |
| Internal Funding Support. Service C | | 6.1 | 6.7 | 4.0 | 4.0 | 6.0 |
| 3-Yr R&D Cost Turbulence | 18.4 | 37.1 | 52.0 | 78.0 | | 41.9 |
| 5-Yr R&D Cost Turbulence | 32.6 | 75.0 | 139.6 | 292.0 | | 100.5 |
| 3-Yr Production Funding Instability | 45.0 | 25.6 | 22.4 | | | 24.8 |
| 5-Yr Production Funding Instability | 114.0 | 148.3 | 70.2 | | | 108.0 |
| Cost Estimating Problems | 0 | 9% | 21% | 0 | | .13 |
| **INTERNAL ENVIRONMENT** | | | | | | |
| Manning Levels, Lead | 7.8 | 8.0 | 8.9 | 8.0 | | 8.4 |
| Manning Levels, Service B | 1.0 | 5.1 | 7.8 | 8.2 | | 6.7 |
| Manning Levels, Service C | | 4.0 | 7.0 | 2.0 | | 5.6 |
| Program Manager Authority | 7.5 | 7.5 | 7.4 | 8.6 | | 7.5 |
| Program Manager Limitations | 7.8 | 8.0 | 7.6 | 8.8 | | 7.9 |
| Oversight Reporting | 7.0 | 8.1 | 6.4 | 8.8 | | 7.5 |
| **EFFECTIVENESS** | | | | | | |
| Integrated Plan Execution Effectiveness | 5.7 | 8.0 | 7.9 | 7.6 | 8.0 | 7.8 |
| Charter Effectiveness | 8.7 | 6.7 | 7.7 | | 9.0 | 7.4 |
| Organization Effectiveness | 38% | 38% | 66% | 63% | 100% | 7.1 |
| Acquisition Strategy Effectiveness | 13% | 53% | 53% | 38% | 100% | 7.1 |
| Organization Approrpiateness | 38% | 38% | 66% | 63% | 100% | 7.1 |
| Cost Sharing Helped | 50% | 78% | 67% | 75% | 100% | 73% |
| Configuration Mgt (Stability) | 53% | 75% | 70% | 83% | | 72% |
| Technical Req Resolution, Current | 1.8 | 3.9 | 3.1 | 3.8 | 4.0 | 3.4 |
| Charter Need | 67% | 53% | 85% | 0 | 100% | 63% |

Fifty-three percent of both JPO and SS W/COM programs rated their acquisition strategies as effective. Thirty-eight percent of the Confederated program participants and 13 percent of the SS W/CORD program participants felt that appropriate acquisition strategies had been chosen.

JPO-organized programs were the most likely and Confederated programs the least likely group of programs to have a charter, 79 percent and zero percent respectively. Ninety-one percent of the JPO programs with a charter stated that the charter was necessary and effective and 45 percent of the JPO programs without a charter stated that a charter would have helped. One Confederated program had a charter and agreed that it was necessary. All of the Confederated programs without a charter stated that a charter was not necessary.

Fifty-eight percent of the SS W/COM programs had a charter. Seventy-five percent of the programs with a charter stated that their charter was necessary. Of those programs without a charter, 79 percent stated that a charter would have helped in the management of the program.

All SS W/CORD programs with a charter stated that it was necessary and effective. Forty percent of the SS W/CORD programs did not have a charter. Half of the programs without a charter stated that a charter was not necessary and the other half stated that a charter would have helped in the management of the program.

### D.3.4 Success Factors

The success factors, other than those which appear in Table D.3-5, have been previously discussed.

Programs organized as JPOs, the most technically complex group of programs, had the least amount of cost and schedule growth. The SS W/COM programs, the least technically complex group of programs, had the greatest amount of cost and schedule growth. As depicted in Figure D.3-6, the more technically complex programs are less likely to achieve a high

TABLE D.3-5

SUCCESS FACTORS

| SUCCESS FACTORS | SS W/ COORD | SS W/ COMMITMENT | JPO | CONFEDERATED | OSD-MANAGED |
|---|---|---|---|---|---|
| Initiation Success | 2.7 | 3.2 | 2.6 | 3.4 | 3.0 |
| Execution Success | 1.9 | 2.5 | 2.4 | | |
| Compound Rate of R&D Cost Growth | 0.24 | 0.71 | 0.13 | | |
| Compound Rate of Production Cost Growth | 0.14 | 0.07 | 0.11 | | |
| Compound Rate of Schedule Slippage | 0.22 | 0.71 | 0.05 | | |
| Selection Harmony | 2.5 | 3.3 | 2.5 | 4.0 | 4.0 |
| Initiation Harmony | 3.3 | 3.7 | 3.4 | 4.0 | 4.0 |
| Execution Harmony | 2.0 | 2.8 | 2.5 | 2.0 | 4.0 |

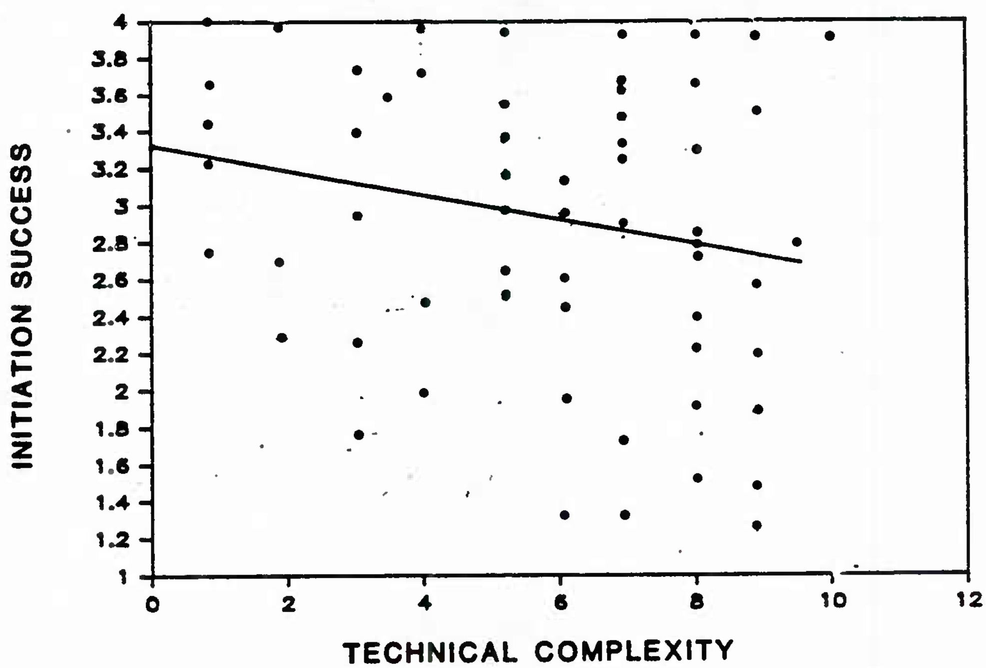


Figure D.3-5 Regression of Technical Complexity and Initiation Success

initiation success rating than are the less technically complex programs. As indicated in Figure D.3-7, a highly complex program is still able to control its cost and schedule growth and thus achieve a high execution success rating. As illustrated in Figures D.3-8 and D.3-9, the more technically complex a program is, the more likely it is to experience low selection and initiation harmony.

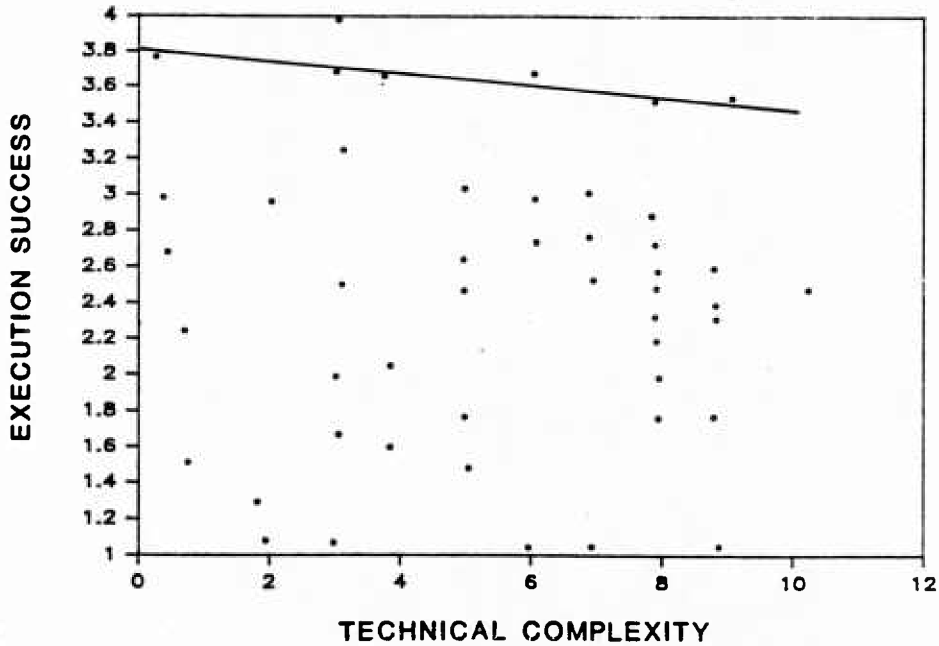


Figure D.3-6 Regression of Technical Complexity and Execution Success

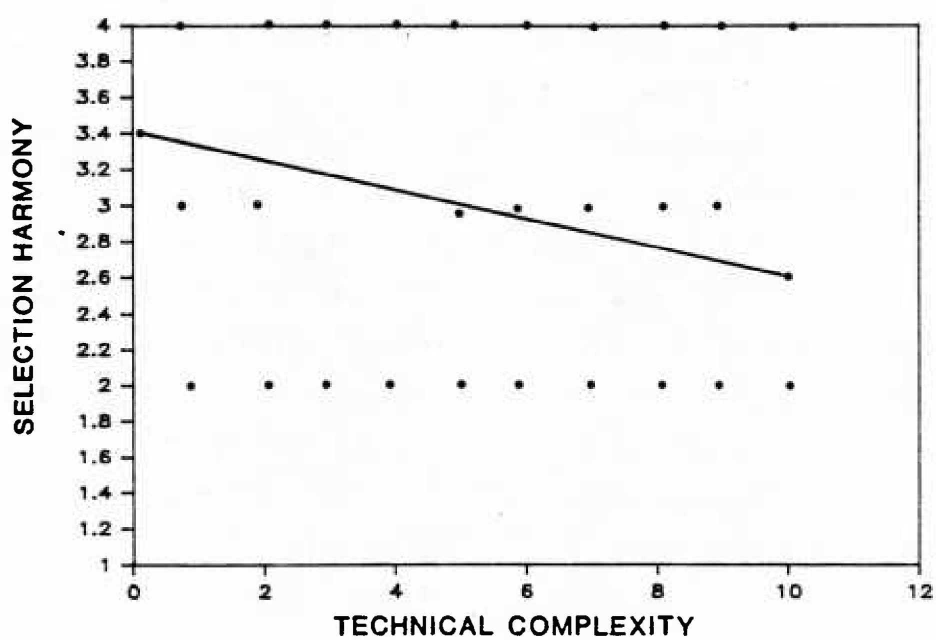


Figure D.3-7 Regression of Technical Complexity and Selection Harmony

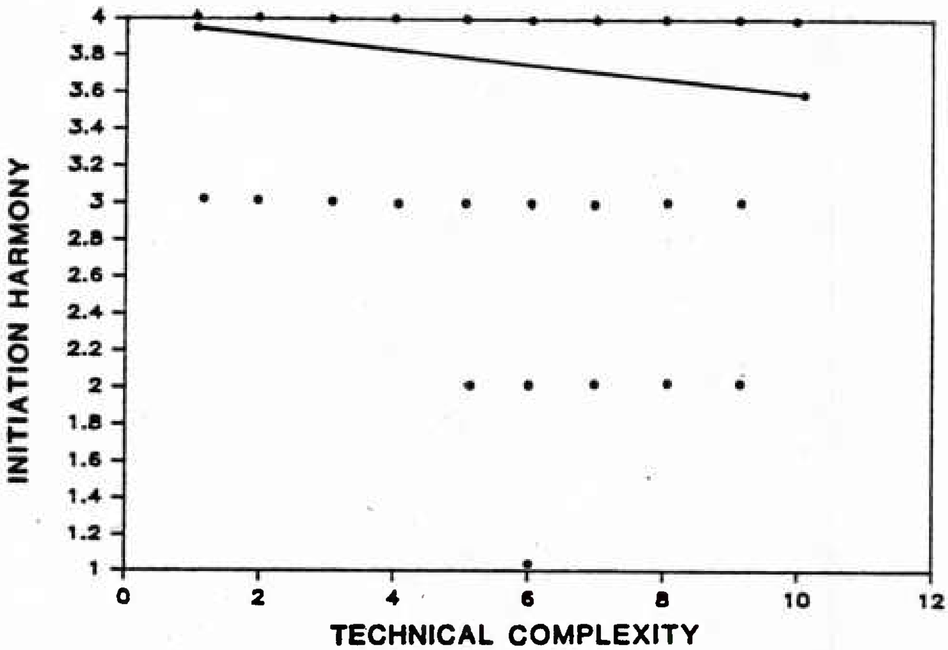


Figure D.3-8 Regression of Technical Complexity and Initiation Harmony

When the two organizational structures with the most technically complex programs (JPOs and SS W/CORDs) are compared with each other, JPOs achieve higher ratings in all the categories except initiation success. The low initiation success rating is probably due to the difficulty associated with establishing a JPO. It was stated previously that the JPO organizational structure was rated as being both more appropriate and effective, better manned, and having less funding instability than SS W/CORD organizations. Figures D.3-10 and D.3-11 show the distribution of the funding instability for the 4 organizational types. The line connecting the points indicates the mean of each distribution.

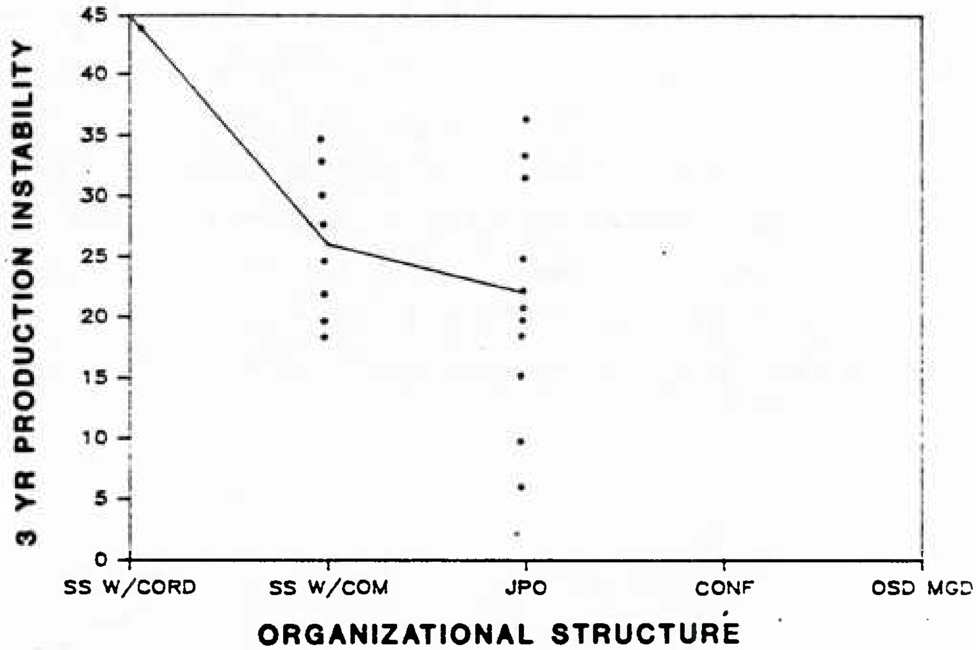


Figure D.3-9 Distribution of Organizational Structure and Three-Year Production Instability

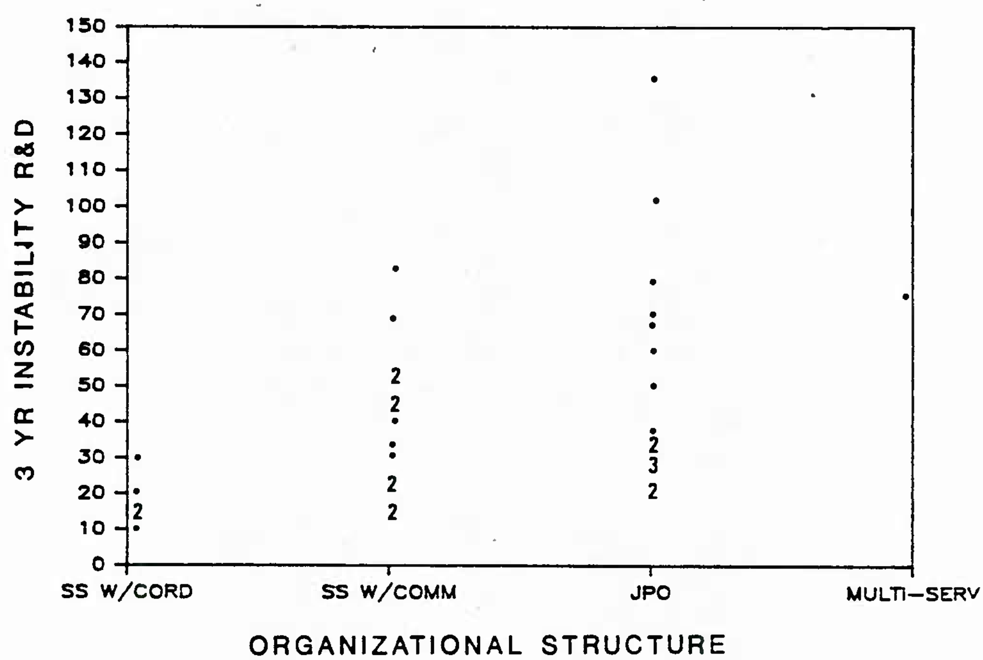


Figure D.3-10 Distribution of Organizational Structure and Three-Year R&D Instability

## D.4 SYSTEM TYPE

As depicted in Figures D.4-1a and b, OSD directed the majority of the aircraft, $C^3I$ navigational equipment, ground combat vehicles, missiles, munitions, space, and technology programs to become joint programs. The Services directed the majority of the component/subsystem programs to become joint. Ground combat support programs were directed to become joint by either Congress or the Services. Hand weapons were directed to become joint programs by Congress, OSD, or the Services.

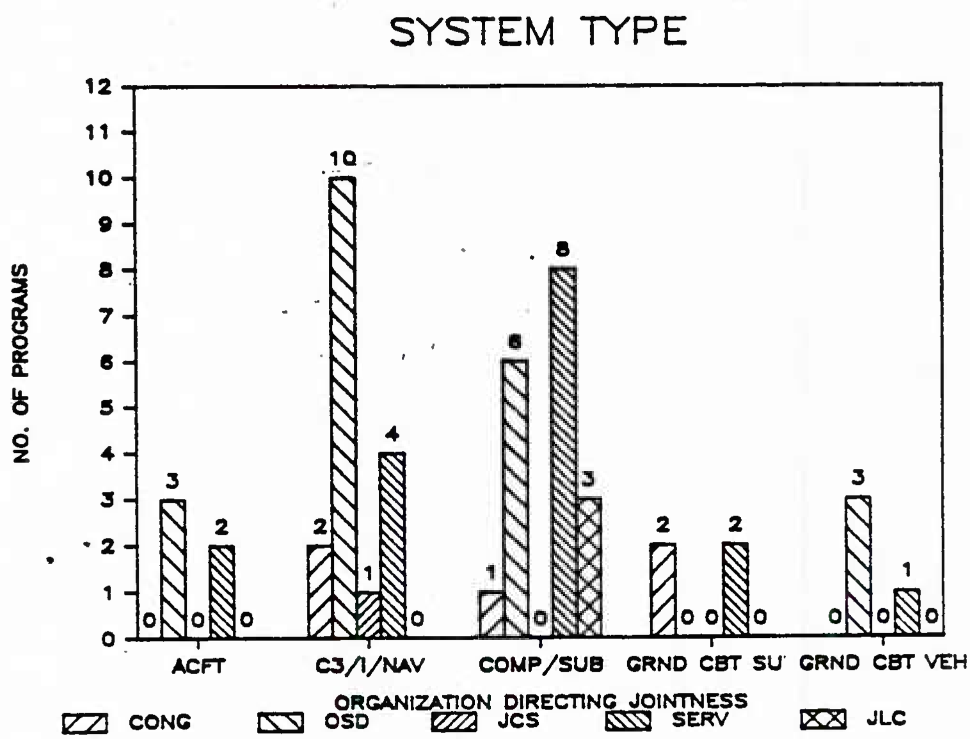


Figure D.4-1a Organization Directing Jointness

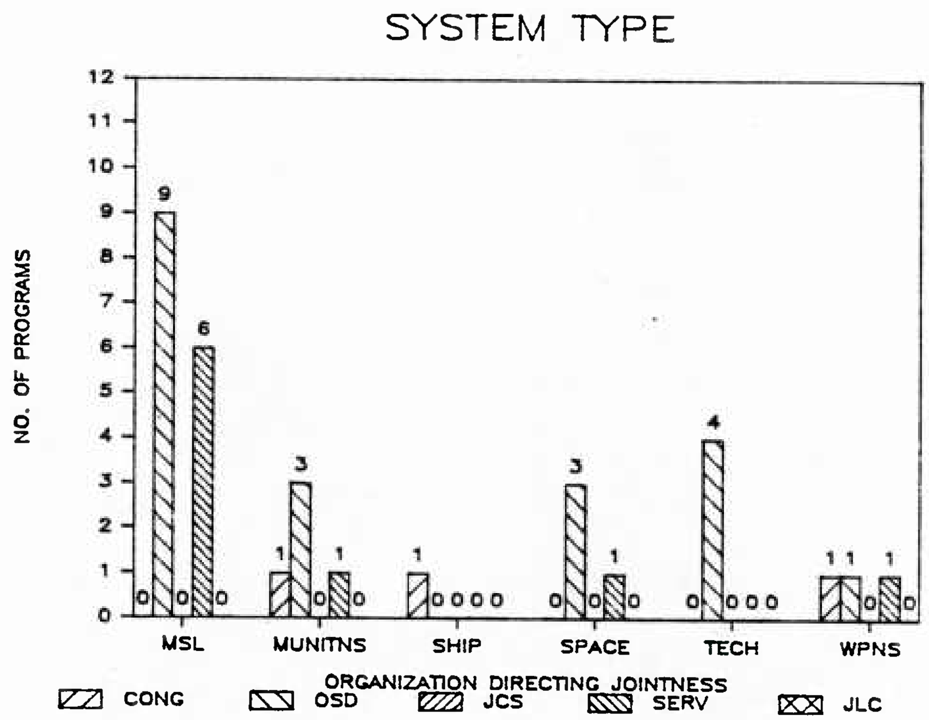


Figure D.4-1b Organization Directing Jointness

### D.4.1 Pre-Joint Factors

As indicated in Table D.4-1, the lead Service of aircraft programs had the most experience from an ongoing effort prior to becoming joint, followed by: ground combat support equipment, space, ground combat vehicles, missiles, munitions, $C^3I$ navigational equipment, component/subsystems, technology, and hand weapons programs. Prior to becoming joint, the lead Service of munitions programs had the most mature program (the farthest along in the acquisition cycle), while space and technology programs' lead Services had the least mature programs. Figures D.4-2a and D.4-2b illustrate the acquisition phase the commodity was in when it became a joint program.

# TABLE D.4-1

## PRE-JOINT FACTORS

| | AIRCRAFT | $C^3I$ NAV | COMPONENT/ SUBSYSTEM | GROUND COMBAT SUPPORT | GROUND COMBAT VEHICLES | MISSILES | MUNITIONS | SHIP | SPACE | TECHNOLOGY | HAND WEAPONS | ALL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Effort of Lead Service | 9.3 | 7.3 | 7.2 | 8.5 | 8.2 | 8.0 | 8.0 | 1.0 | 8.3 | 6.0 | 5.7 | 7.5 |
| Prior Effort of Service B | 5.5 | 6.0 | 5.8 | 4.5 | 5.0 | 6.2 | 3.5 | 2.0 | 6.3 | 4.3 | 5.3 | 5.5 |
| Prior Effort of Service C | 5.5 | 4.4 | 4.6 | 5.0 | 1.0 | | | 2.0 | 4.0 | 3.7 | 3.0 | 4.2 |
| Point in Acquisition Cycle Lead | 2.7 | 2.4 | 2.7 | 2.5 | 2.0 | 2.5 | 3.0 | | 1.8 | 1.8 | 2.5 | 2.5 |
| Point in Acquisition Cycle, Service B | 0.8 | 1.9 | 2.1 | 1.0 | 0.4 | 2.3 | 1.0 | | 1.5 | 1.8 | 1.7 | 1.7 |
| Point in Acquisition Cycle, Service C | 2.0 | 2.0 | 1.7 | 1.3 | 0.0 | | | | | 2.0 | | 1.7 |
| Documented Need of Lead Service | 1.0 | 0.8 | 0.8 | 1.0 | 0.6 | 0.9 | 1.0 | 0.0 | 1.0 | 0.8 | 0.7 | 0.83 |
| Documented Need of Service B | 1.0 | 0.8 | 0.7 | 0.3 | 0.8 | 0.6 | 0.8 | 0.0 | 1.0 | 0.5 | 0.0 | 0.69 |
| Documented Need of Service C | 0.5 | 0.4 | 0.6 | 0.3 | 0.0 | | | 0.0 | 1.0 | 0.7 | 0.0 | 0.46 |
| Priority of Need of Lead Service | 1.3 | 1.7 | 2.3 | 2.8 | 1.4 | 1.6 | 2.3 | 1.0 | 1.3 | 1.5 | 2.7 | 1.7 |
| Priority of Need of Service B | 2.2 | 1.6 | 2.5 | 2.3 | 1.4 | 1.8 | 1.3 | 1.0 | 1.8 | 2.5 | 2.3 | 2.0 |
| Priority of Need of Service C | 2.0 | 1.8 | 3.0 | 2.3 | 1.5 | | | 3.0 | 1.5 | 2.7 | 1.0 | 2.2 |

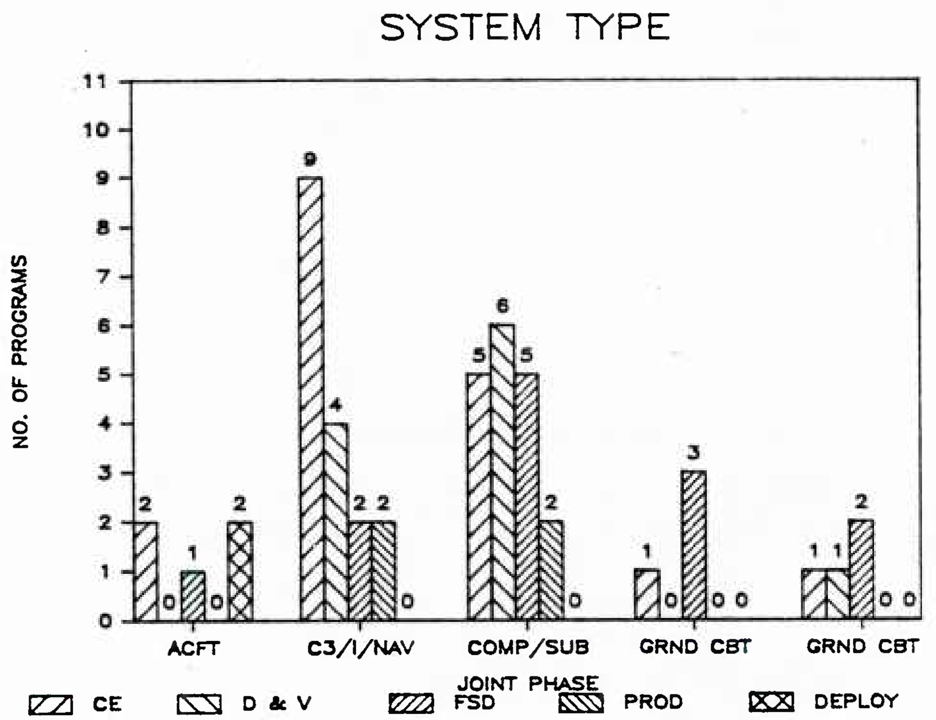


Figure D.4-2a Acquisition Phase When Designated Joint

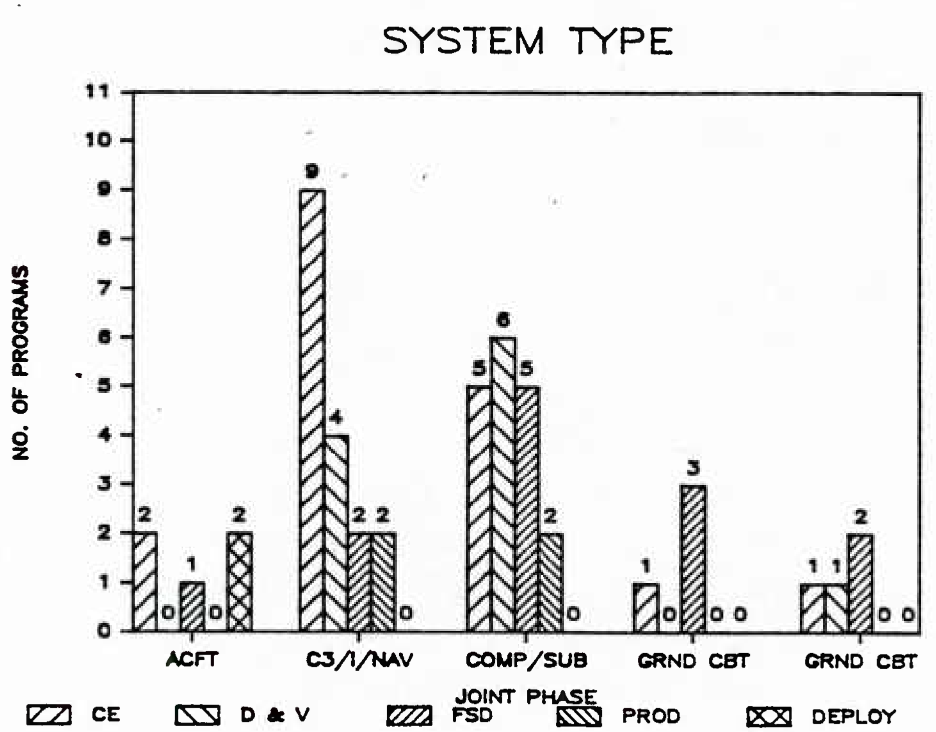


Figure D.4-2b Acquisition Phase When Designated Joint

The lead Services of aircraft, ground combat support equipment, munitions, and space programs had a well documented need for the end items. Space equipment is the only category where all three Services had a well documented need for the end item. Participating Service (B) of aircraft, component subsystems, missiles, space, and technology programs had a greater need for the end-item commodity than did the lead Service. Participating Service (C) of ship, technology, ground combat vehicles, component subsystems, and $C^3I$ navigational equipment programs had a greater need for the end item than did either the lead Service or the second participating Service.

### D.4.2 Selection and Initiation Factors

Schedule and Commonality Factors - As indicated in Table D.4-2, hand weapons and munitions programs had the highest percentage of commonality among the participants and Aircraft programs had the lowest percentage of commonaltiy among the Service participants. The Services spent the highest percentage of program dollars on Service-unique equipment for aircraft and the least for hand weapons. Aircraft programs are the only ones that experienced a roles and missions requirements difference because of becoming joint.

Inter-Service Agreements - Hand weapons, munitions, and missile programs were the most likely to use a charter. Ground combat support equipment, component/subsystems, and aircraft programs were the least likely to use a charter. All the commodities used inter-Serivce agreements. Table D.4-3 lists the commodity and where the majority of the inter-Service agreements were negotiated.

TABLE D.4-2

SELECTION AND INITIATION FACTORS

| | AIRCRAFT | $C^3I$ NAV | COMPONENT/ SUBSYSTEM | GROUND COMBAT SUPPORT | GROUND COMBAT VEHICLES | MISSILES | MUNITIONS | SHIP | SPACE | TECHNOLOGY | HAND WEAPONS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SCHEDULE AND COMMONALITY FACTORS** | | | | | | | | | | | |
| Timeliness Similarity Index | 4.3 | 1.1 | 0.9 | 1.0 | 0.40 | 0.86 | 0.78 | 0.0 | 0.50 | 0.0 | 0.0 |
| Timeliness Compromise Index, Lead | 0.0 | 0.3 | 0.5 | 0.3 | 0.0 | 0.08 | 0.0 | 0.0 | 0.0 | 0.33 | 0.0 |
| Timeliness Compromise Index, Service B | 0.0 | 0.5 | 0.6 | 0.3 | 0.0 | 0.09 | 0.0 | 0.0 | 0.0 | 0.33 | 0.0 |
| Timeliness Compromise Index, Service C | 0.0 | 0.4 | 0.2 | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 |
| Commonality Percentage | 70% | 90% | 80% | 90% | 95% | 81% | 99% | 100% | 81% | | 100% |
| Commonality of Specifications | 67% | 84% | 80% | 93% | 68% | 78% | 73% | 100% | 87% | | 100% |
| Roles & Missions Differences | 50% | 6% | 0 | 0 | 0 | 7% | 0 | 0 | 0 | 0 | 0 |
| **TECHNICAL FACTORS** | | | | | | | | | | | |
| Technical Complexity | 7.2 | 7.3 | 4.5 | 2.3 | 2.7 | 7.1 | 4.0 | 3.0 | 6.8 | 8.0 | 2.7 |
| Technical Requirements Similarity Index | 0.5 | 0.8 | 0.8 | 0.9 | 0.66 | 0.81 | 0.96 | 0.95 | 0.76 | 0.90 | 0.99 |
| Technical Requirements Resolution, Initial | 3.0 | 3.2 | 3.3 | 4.3 | 2.6 | 3.7 | 4.8 | 4.0 | 3.8 | 4.5 | 4.3 |
| Technical Requirements Compromise, Lead | 3.2 | 3.4 | 3.7 | 4.5 | 3.0 | 4.2 | 2.8 | 4.0 | 3.8 | 4.0 | 4.7 |
| Technical Requirements Compromise, Service B | 2.6 | 3.5 | 3.3 | 4.3 | 2.8 | 4.3 | 4.8 | 4.0 | 4.0 | 4.5 | 4.3 |
| Technical Requirements Compromise, Service C | 3.0 | 3.4 | 3.0 | 4.7 | 4.5 | | | | 4.0 | 4.5 | 5.0 |
| **INTER- AND INTRA-SERVICE AGREEMENTS** | | | | | | | | | | | |
| Charter Existence | 40% | 70% | 40% | 30% | 75% | 80% | 100% | 0 | 50% | 75% | 100% |
| Cost Benefit Analysis | 20% | 19% | 24% | 0 | 0 | 0 | 0 | 0 | 25% | 0 | 0 |
| Cost Sharing Agreement | 1.4 | 1.5 | 1.2 | 1.5 | 2.0 | 1.3 | 1.8 | | 1.0 | 1.3 | 2.0 |
| Memorandum of Agreement | 100% | 70% | 60% | 0 | 75% | 73% | 75% | 100% | 100% | 75% | 33% |
| Inter-Service Agreements | 2.8 | 6.8 | 6.0 | 6.0 | 8.3 | 7.0 | 8.0 | | 8.5 | 7.8 | 5.0 |
| Negotiation Level | 2.6 | 3.1 | 3.2 | 3.3 | 3.0 | 3.2 | 2.8 | 4.0 | 2.5 | 4.3 | 2.3 |
| **EXTERNAL FACTORS** | | | | | | | | | | | |
| External Selection for Jointness | 0.6 | 0.7 | 0.4 | 0.5 | 0.75 | 0.60 | 0.75 | 1.0 | 0.75 | 1.0 | 0.67 |
| Rationale Index for Jointness | 3.2 | 1.6 | 2.8 | 2.5 | 1.5 | 2.1 | 2.0 | 3.0 | 2.3 | 3.3 | 1.0 |
| Basis for Selection of Lead Service | 3.0 | 3.8 | 3.2 | 4.0 | 1.5 | 4.1 | 3.3 | 4.0 | 2.8 | 4.7 | 1.7 |
| Designation of Lead Service | 2.8 | 2.8 | 3.0 | 3.5 | 2.5 | 2.5 | 2.5 | 3.0 | 2.0 | 2.0 | 2.3 |

TABLE D.4-3

NEGOTIATION LEVEL OF INTER-SERVICE AGREEMENTS

| TYPE OF PROGRAM | NEGOTIATION LEVEL | PERCENTAGE |
|---|---|---|
| Aircraft | Service Secretariate | 40% |
| Ground Combat Support | Service Headquarters | 50% |
| $C^3I$ Navigational Equip. | Service Headquarters | 33% |
| Component Subsystems | Service Headquarters | 31% |
| Ground Combat Vehicles | Service Headquarters | 50% |
| | Product Division | 50% |
| Missiles | Service Headquarters | 43% |
| Munitions | Service headquarters | 40% |
| | Product Division | 40% |
| Space | Service Headquarters | 50% |
| Hand Weapons | Service Headquarters | 67% |
| Technology | Other | 50% |

External Factors - The rationale behind a decision to go joint was interoperability, cost savings, interoperability and cost savings (both), or other. Half of the commodities cited cost savings and the other half cited both interoperability and cost savings as the prime reason for jointness.

Once a program was selected to become joint, a lead Service was designated. In every commodity category, OSD was the primary organization responsible for selecting the lead Service. Aircraft, $C^3I$ navigational equipment, component/subsystems; ground combat support, missiles, munitions, and technology programs all cited technological capability due to previous efforts as the major reason for the selection of the lead Service. Ground combat vehicles had a lead Service chosen because of either the greatest need or the largest dollar buy. Space programs cited prior agreements and hand weapons cited the largest dollar buy as the major reason for the selection of the lead Service.

### D.4.3 Execution Factors

Funding - As indicated in Table D.4-4, ground combat support equipment had the best funding support from both internal and external sources. Technology, hand weapons, and ground combat vehicle programs received stronger funding commitments from their participating Services than they did from their lead Services.

Internal Environment - As depicted in Figures D.4-3a and D.4-3b, the majority of the aircraft, missiles, and space programs had JPOs. The majority of the ground combat support equipment, ground vehicles, munitions, hand weapons, and the ship (one) are all organized as SS/COM.

Space, technology, and $C^3I$ navigational equipment programs were the most fully staffed by all participants. Aircraft and ground combat vehicle programs were well staffed by the lead Service, but not by the participating Services. Ground combat vehicles and hand weapons programs had the lowest staffing profiles (combines all participants) of all commodities.

Program managers of component/subsystems and hand weapons programs were subjected to more complex oversight/reporting requirements and coordination problems and they had more special controls placed on them than did the PMs of the other commodities. The PMs of the $C^3I$ navigational equipment, ground combat vehicles, and space programs had the fewest oversight/reporting problems and special controls placed on them.

## TABLE D.4-4
## EXECUTION FACTORS

| | AIRCRAFT | C³I NAV | COMPONENT/ SUBSYSTEM | GROUND COMBAT SUPPORT | GROUND COMBAT VEHICLES | MISSILES | MUNITIONS | SHIP | SPACE | TECHNOLOGY | HAND WEAPONS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **FUNDING** | | | | | | | | | | | |
| Cost Sharing Stability Index | 5.8 | 7.1 | 6.7 | 9.0 | 7.5 | 5.5 | 8.0 | | 6.3 | 9.0 | 7.3 |
| Cost Sharing Problems | 0.40 | 0.31 | 0.42 | 0.0 | 0.0 | 0.67 | 0.25 | | 0.0 | 0.50 | 0.0 |
| Funding Commitment, Lead | 8.5 | 7.0 | 6.9 | 7.8 | 7.0 | 6.5 | 6.0 | 8.0 | 7.8 | 7.3 | 6.3 |
| Funding Commitment, Service B | 4.6 | 7.1 | 6.8 | 8.0 | 7.8 | 6.1 | 7.3 | | 6.7 | 8.3 | 7.0 |
| Funding Commitment, Service C | 4.0 | 4.8 | 5.0 | 7.5 | 7.5 | | | | 6.5 | 8.5 | 8.0 |
| External Funding Support | 7.8 | 6.7 | 8.9 | 10.0 | 4.8 | 7.2 | 5.8 | 4.0 | 9.3 | 8.7 | 5.3 |
| Internal Funding Support, Lead | 8.2 | 7.0 | 6.1 | 7.3 | 6.8 | 5.7 | 5.8 | 8.0 | 7.5 | 5.5 | 6.0 |
| Internal Funding Support, Service B | 5.4 | 7.4 | 6.1 | 8.3 | 7.8 | 5.2 | 7.5 | | 7.7 | 6.3 | 6.7 |
| Internal Funding Support. Service C | 3.5 | 4.8 | 4.0 | 7.5 | 7.5 | | | | 8.5 | 6.0 | 8.0 |
| 3-Yr R&D Cost Turbulence | | 41.0 | 28.11 | 30.5 | 75.5 | 53.6 | 40.0 | 46.0 | 31.0 | | |
| 5-Yr R&D Cost Turbulence | 27.0 | 116.4 | 95.7 | 64.5 | 172.5 | 123.3 | 37.0 | 115.0 | 31.0 | 25.0 | |
| 3-Yr Production Funding Instability | | 31.5 | 22.0 | 31.5 | 24.0 | 19.8 | 32.0 | | 31.0 | | |
| 5-Yr Production Funding Instability | | 109.4 | 207.0 | 207.0 | 268.0 | 53.5 | 48.0 | | 151.0 | | 45.0 |
| Cost Estimating Problems | 0.25 | 0.19 | 0.0 | 0.0 | 0.25 | 0.21 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **INTERNAL ENVIRONMENT** | | | | | | | | | | | |
| Manning Levels, Lead | 9.0 | 8.3 | 8.0 | 9.3 | 8.3 | 8.4 | 8.0 | 7.0 | 9.8 | 8.5 | 7.7 |
| Manning Levels, Service B | 5.3 | 7.4 | 7.9 | | 3.8 | 6.2 | 5.0 | 6.0 | 9.0 | 7.5 | 1.0 |
| Manning Levels, Service C | 3.0 | 6.8 | 4.5 | | 1.0 | | | | 6.0 | 8.0 | |
| Program Manager Authority | 7.3 | 6.8 | 8.1 | 6.6 | 6.5 | 7.7 | 8.5 | 9.0 | 7.3 | 8.7 | 8.0 |
| Program Manager Limitations | 7.7 | 7.0 | 8.3 | 7.8 | 7.3 | 8.2 | 9.0 | 9.0 | 7.3 | 9.0 | 9.0 |
| Oversight Reporting | 7.0 | 7.1 | 8.6 | 8.0 | 6.0 | 6.7 | 7.5 | 9.0 | 9.3 | 6.7 | 8.0 |
| **EFFECTIVENESS** | | | | | | | | | | | |
| Integrated Plan Execution Effectiveness | 7.2 | 7.6 | 6.5 | 8.0 | 9.3 | 8.6 | 7.8 | 9.0 | 7.8 | 8.8 | 8.3 |
| Charter Effectiveness | 7.5 | 7.5 | 7.7 | | 5.0 | 6.9 | 8.3 | | 8.5 | 9.3 | 7.7 |
| Organization Effectiveness | 7.6 | 7.0 | 6.6 | 7.8 | 7.3 | 6.9 | 7.8 | 7.0 | 7.8 | 8.5 | 7.0 |
| Acquisition Strategy Effectiveness | 7.6 | 7.3 | 7.9 | 7.8 | 8.7 | 6.7 | 6.3 | 9.0 | 6.3 | 8.5 | 8.0 |
| Organization Approrpiateness | 7.8 | 7.2 | 6.5 | 7.8 | 6.8 | 6.9 | 7.8 | 7.0 | 7.0 | 9.5 | 6.7 |
| Cost Sharing Helped | 60% | 71% | 82% | 100% | 75% | 60% | 75% | | 75% | 75% | 67% |
| Configuration Mgt (Stability) | 4.7 | 7.4 | 7.7 | 7.3 | 4.5 | 7.8 | 8.3 | 9.0 | 6.8 | 8.0 | 5.5 |
| Technical Req Resolution, Current | 2.5 | 3.3 | 2.9 | 4.3 | 2.6 | 3.7 | 4.8 | 4.0 | 3.8 | 4.5 | 4.7 |
| Charter Need | 50% | 71% | 40% | 25% | 100% | 69% | 100% | | 50% | 75% | 100% |

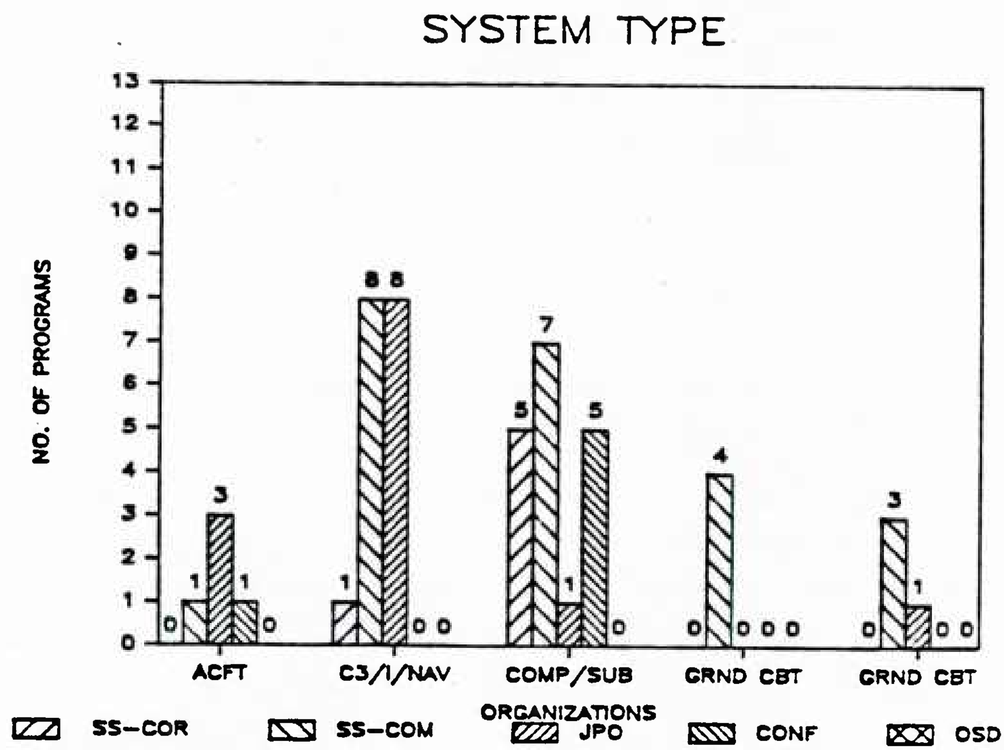


Figure D.4-3a Program Management Organization

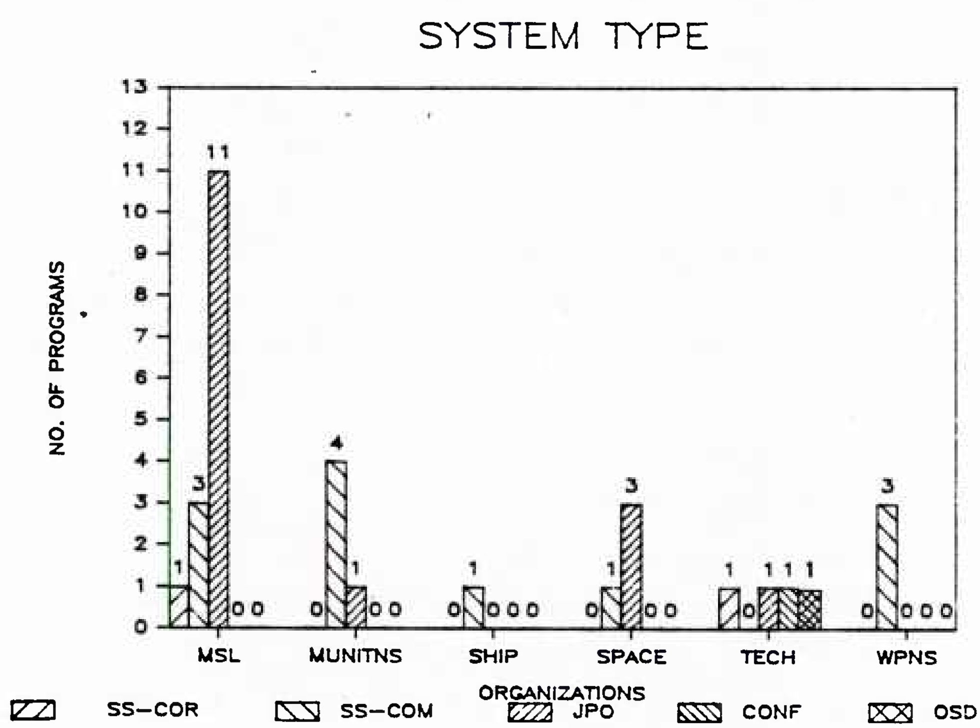


Figure D.4-3 Program Management Organization

Ground combat vehicles, ground combat support, and $C^3I$ navigational equipment program managers felt that they were given less authority to make trade-offs between cost, schedule, performance, and supportability, identify funding needs, and control the funds allocated than did the managers of the other commodities. They also felt that they had less authority to determine and control hardware and software configurations and manage program office military and civilian personnel than did the managers of the other commodities.

Effectiveness - The aircraft, missile, and ground combat vehicle programs that had JPOs consistently rated their organizations as appropriate. The component/subsystem programs organized as Confederated programs consistently rated their organizations as both effective and appropriate. Technology and $C^3I$ navigational equipment rated all organizational structures as both highly effective and most appropriate. Ground combat support equipment and hand weapons have no comparative basis since all programs in both commodities were organized as SS W/COMs. Munitions programs had only one program that was not organized as an SS W/COM and space had only one program that was not organized as a JPO so there was no comparative basis for these commodities either. For the commodities with several different organizational structures, the JPOs and the Confederated organizational structures were consistently rated as the most effective.

### D.4.4 Success Factors

The success factor table for commodities is not presented. There is little (if any) relationship between the commodity type and how successfully a program is executed. The level of interest, degree of funding stability, organizational structure, and management affect how well that system will progress through its acquisition cycle.

Similar systems organized differently were analyzed to determine if a certain type of organizational structure was more appropriate for a certain commodity. $C^3I$ navigational equipment, component/subsystems, missiles, and technology programs were all analyzed by organizational structures. The other commodities had similar organizations so there was no comparative basis for analyzing these system types.

$C^3I$ navigational equipment programs organized in SS W/COMs had less cost and schedule growth and more selection, initiation, and execution harmony than those programs organized in JPOs. Component/subsystem programs organized in Confederated organizations experienced more selection and initiation harmony than those programs organized as SS W/CORDs and SS W/COMs. Missile programs that had JPOs experienced less selection, initiation, and execution harmony than those programs organized in SS W/COMs and SS W/CORDs. There was not enough information to determine if cost and schedule growth was greater for technology programs organized in SS W/CORDs, JPOs, Confederated, or OSD-managed organizations.

## D.5 ORGANIZATION THAT DIRECTED JOINTNESS

Determining the organization that established the joint program was somewhat difficult. Congressional interest in a program often prompted OSD to take the initiative in establishing a program as joint. In cases where internal Service actions led to a joint program, but an OSD directive was required to actually initiate the program, origination was credited to the Services. There will be little discussion about JCS-directed programs as there is only one such program in the data base.

The study group collected information as to whether a joint program was established by the Office of the Secretary of Defense (OSD), Congress, the Joint Chiefs of Staff (JCS), the Services, or the Joint Logistics Commanders (JLC). As depicted in Figures D.5-1 through D.5-5, OSD directed the majority (52 percent) of the 80 programs in the data base to be joint.

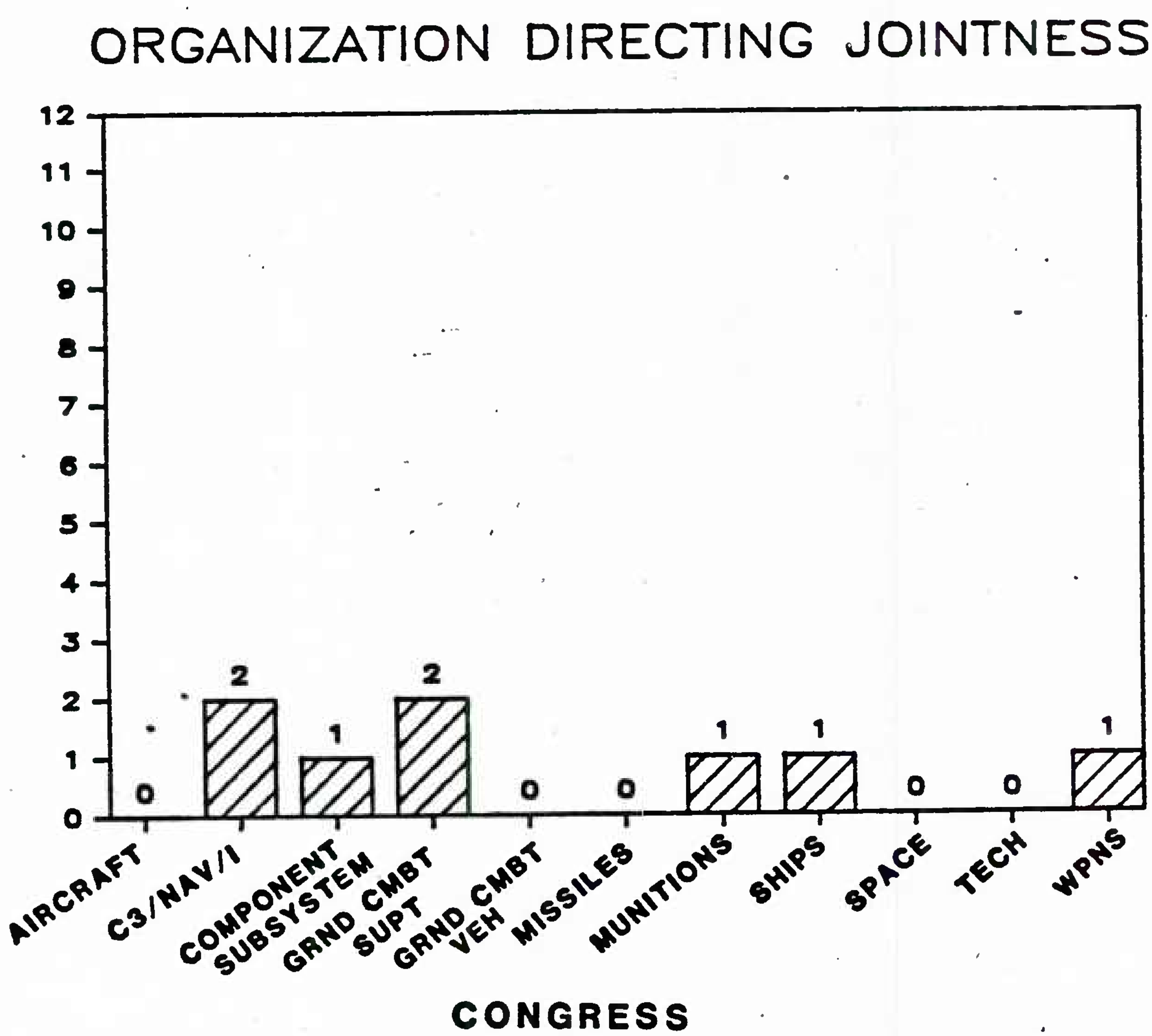


Figure D.5-1 Jointness Directed by Congress

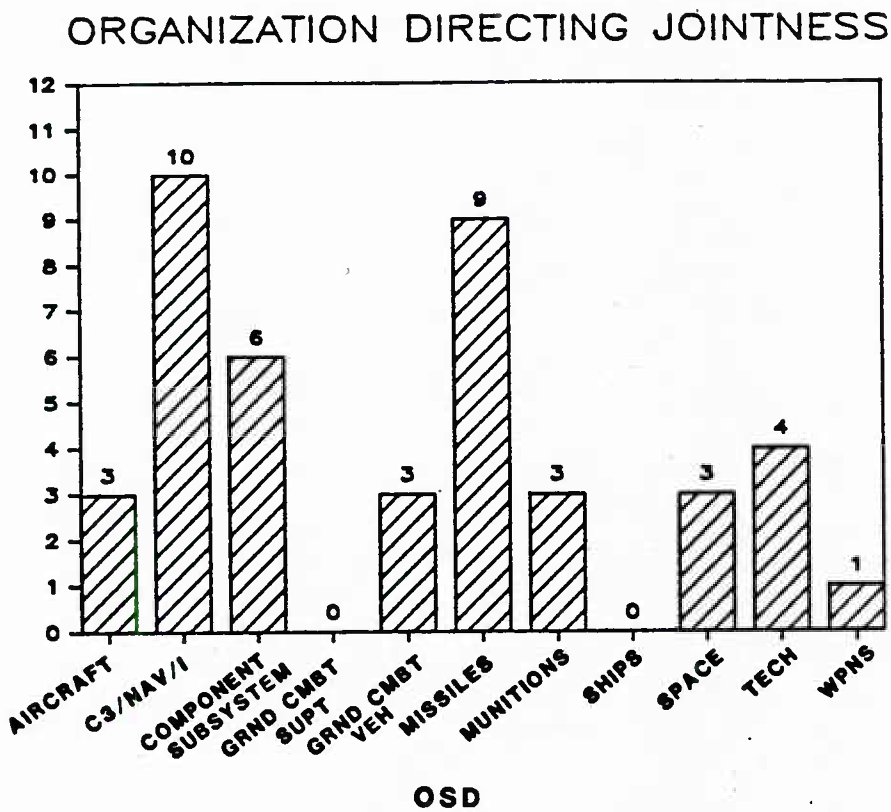


Figure D.5-2 Jointness Directed by OSD

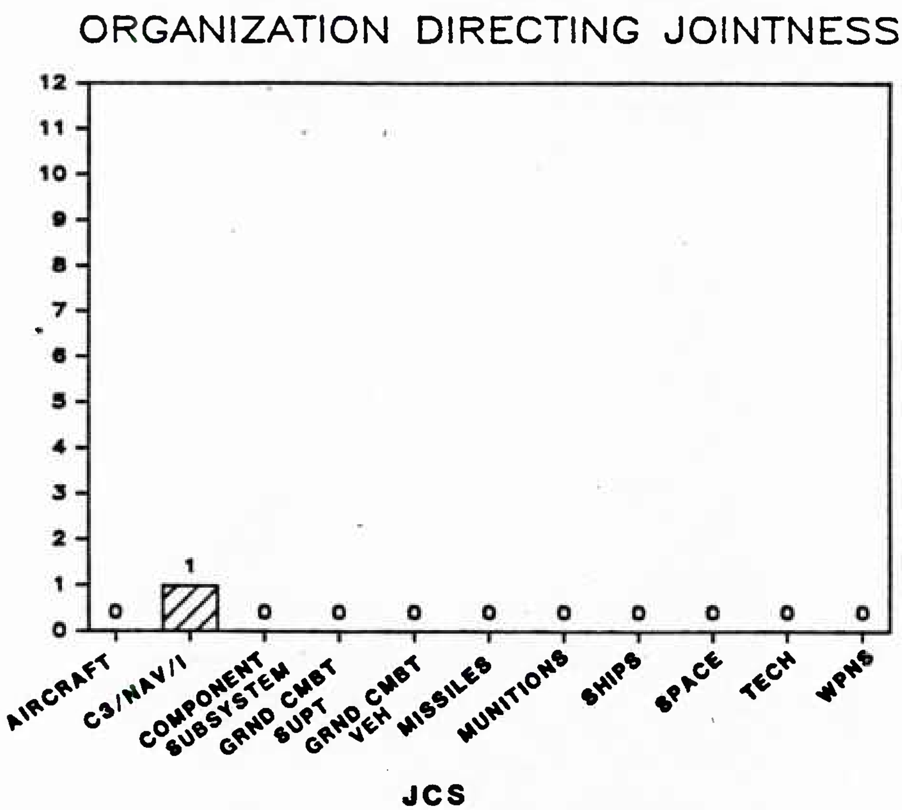


Figure D.5-3 Jointness Directed by the JCS

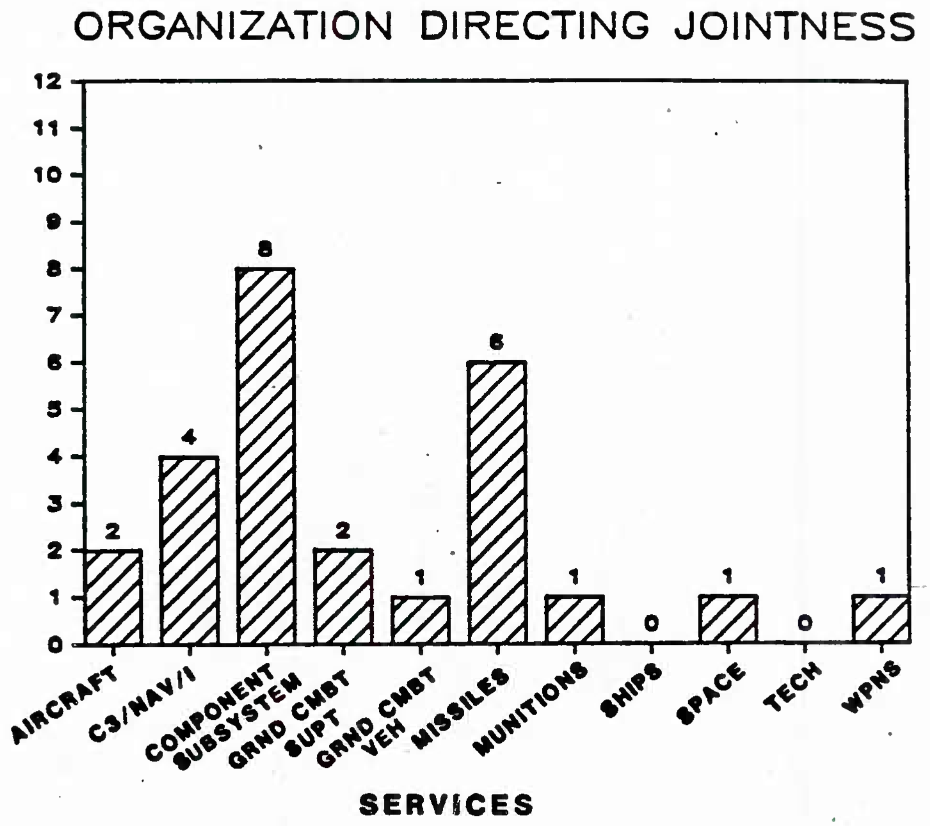


Figure 5.1-4 Jointness Directed by the Services

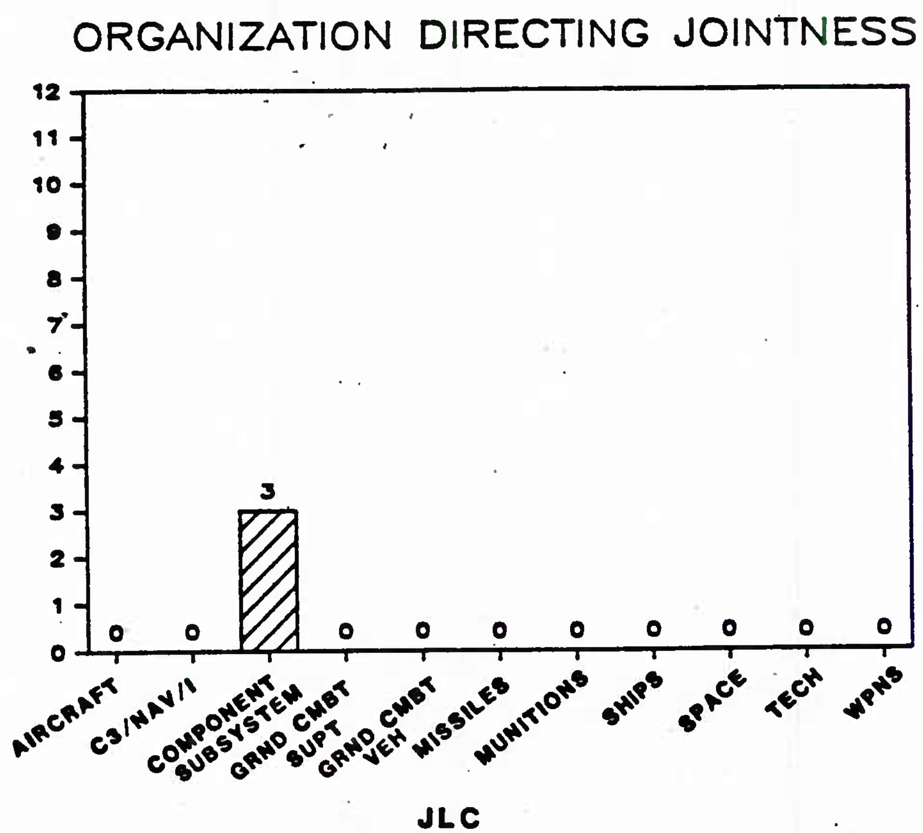


Figure D.5-5 Jointness Directed by the JLC

### D.5.1 Pre-Joint Environment

Figure D.5-6 illustrates that 79 percent of the programs directed by OSD, 67 percent of the programs directed by the JLCs, 63 percent of the programs directed by Congress, and 42 percent of the programs directed by the Services became joint during pre-FSD.

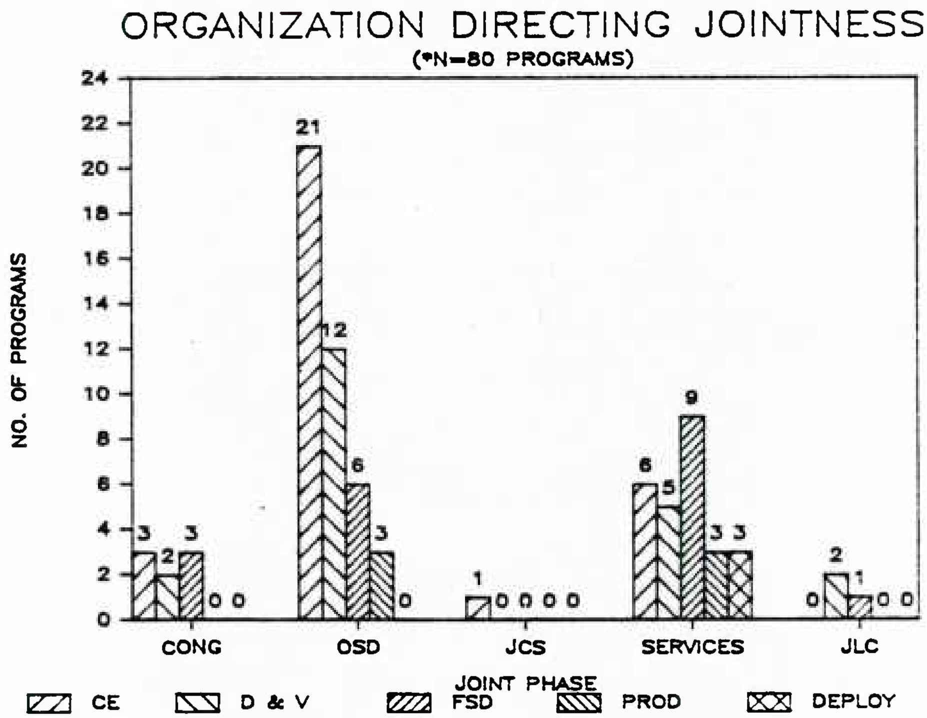


Figure D.5-6 Organization Directing Jointness and the Program's Acquisition Phase When it was Made Joint

As indicated in Table D.5-1, joint programs directed by Congress had participants with the least amount of documented need, but the greatest priority of need for the end item. Although the JLC-directed programs had Services with

TABLE D.5-1

PRE-JOINT FACTORS

| | CONGRESS | OSD | JCS | SERVICES | JLC |
|---|---|---|---|---|---|
| Prior Effort of Lead Service | 5.9 | 6.8 | 9.0 | 8.3 | 7.5 |
| Prior Effort of Service B | 6.1 | 7.2 | 8.0 | 8.5 | 7.0 |
| Prior Effort of Service C | 4.6 | 5.7 | 8.0 | 5.4 | 8.0 |
| Point in Acquisition Cycle Lead | 3.5 | 3.6 | 8.0 | 4.6 | 8.0 |
| Point in Acquisition Cycle, Service B | 2.3 | 2.0 | 4.0 | 3.0 | 3.5 |
| Point in Acquisition Cycle, Service C | 1.3 | 1.1 | 4.0 | 2.1 | 2.0 |
| Documented Need of Lead Service | 62% | 83% | 100% | 85% | 100% |
| Documented Need of Service B | 42% | 75% | 100% | 62% | 100% |
| Documented Need of Service C | 16% | 50% | 100% | 44% | 100% |
| Priority of Need of Lead Service | 1.8 | 1.9 | 1.0 | 1.8 | 3.0 |
| Priority of Need of Service B | 1.6 | 2.1 | 1.0 | 1.9 | 3.0 |
| Priority of Need of Service C | 2.0 | 2.2 | 1.0 | 2.3 | 3.0 |

the greatest documented need (100 percent for all participants), these programs did not have a high priority of need for the end item.

D.5.2 Selection and Initiation

Schedule and Commonality Factors - As indicated in Table D.5-2, programs that the JLC directed to become joint had participants with no pre-joint needed IOC date differences and participants who agreed on end items that were 100 percent common. The programs that Congress directed to become joint had participants with small (3-month) pre-joint needed IOC date differences. The participants were able to agree on end items that were, on average, 95 percent common to all and, therefore, did not require any of the Services to spend money on Service-unique items.

The Service-directed programs' participants averaged a 9-month pre-joint needed IOC date difference. However, after jointness, the participants anticipated a needed IOC

## TABLE D.5-2
## SELECTION AND INITIATION FACTORS

| | CONGRESS | OSD | JCS | SERVICES | JLC |
|---|---|---|---|---|---|
| **SCHEDULE AND COMMONALITY FACTORS** | | | | | |
| Timeliness Similarity Index | 3 Mo | 11 Mo | 0.0 | 9 Mo | 0.0 |
| Timeliness Compromise Index, Lead | 0.0 | 3 Mo | 0.0 | 2 Mo | 0.0 |
| Timeliness Compromise Index, Service B | 0.0 | 3 Mo | 0.0 | 2 Mo | 0.0 |
| Timeliness Compromise Index, Service C | 0.0 | 1 Mo | 0.0 | 3 Mo | 0.0 |
| Commonality Percentage | 100% | 83% | | 92% | |
| Commonality of Specifications | 95% | 76% | | 83% | 100% |
| Roles & Missions Differences | 0.0 | 9% | 0.0 | 0.0 | 0.0 |
| **TECHNICAL FACTORS** | | | | | |
| Technical Complexity | 4.1 | 6.4 | 7.0 | 5.3 | 5.5 |
| Technical Requirements Similarity Index | 89% | 74% | 90% | 90% | 75% |
| Technical Requirements Resolution, Initial | 3.8 | 3.2 | 4.0 | 4.0 | 3.0 |
| Technical Requirements Compromise, Lead | 4.0 | 3.4 | 4.0 | 4.3 | 3.0 |
| Technical Requirements Compromise, Service B | 3.6 | 3.5 | 4.0 | 4.3 | 3.0 |
| Technical Requirements Compromise, Service C | 4.3 | 3.7 | 0.0 | 4.3 | 3.0 |
| **INTER- AND INTRA-SERVICE AGREEMENTS** | | | | | |
| Charter Existence | 63% | 63% | 100% | 43% | |
| Cost Benefit Analysis | 0 | 15% | 0 | 12% | 0 |
| Cost Sharing Agreement | 1.6 | 1.4 | 1.0 | 1.4 | 1.0 |
| Memorandum of Agreement | 34% | 71% | | 75% | 50% |
| Inter-Service Agreements | 6.0 | 6.7 | 9.0 | 7.1 | 8.0 |
| Negotiation Level | 3.0 | 3.2 | 5.0 | 2.9 | 3.0 |
| **EXTERNAL FACTORS** | | | | | |
| External Selection for Jointness | 100% | 100% | 0 | 0 | 0 |
| Rationale Index for Jointness | 2.0 | 2.1 | 1.0 | 2.6 | 3.5 |
| Basis for Selection of Lead Service | 3.0 | 3.5 | 2.0 | 3.5 | 4.0 |
| Designation of Lead Service | 2.3 | 2.2 | 5.0 | 3.5 | 4.0 |

date compromise of between 2 to 3 months on average. The Services were able to agree on end items that were, on average, 83 percent common to all and, therefore, spent 92 percent of total program dollars on common equipment.

OSD-directed program participants had the greatest pre-joint needed IOC date differences (11 months). After the participants joined into a single program, they only anticipated a 1 to 3 month IOC date compromise. This group of programs is the only group that experienced a difference in roles and missions capabilities as a result of jointness. As a result of these differences, the Services were able to agree on a product that was only, on average, 76 percent common and spent an average of 17 percent of the program dollars on Service-unique items.

Technical Factors - It must be noted that OSD programs were the most technically complex group of programs (the single JCS program not withstanding), and that there were significant differences in the requirements of the participants in these OSD-directed programs. These differences required greater compromises (especially from the lead Services) than did the less technically complex Congressionally- or Service-directed programs. Although the JLC-directed programs were not as technically complex as the OSD-directed programs, the JLC programs required greater compromise in requirements as a result of having gone joint. The Service- and JCS-selected programs were fairly comparable in complexity. The programs Congress selected to become joint were the least technically complex of all programs.

Inter-Service Agreements - Seventy-three percent of the OSD-directed programs had a charter. Ninety-two percent of those with a charter indicated that it was necessary and

effective. Forty-four percent of the programs without a charter expressed that a charter would have helped in the management of the program.

Forty-three percent of the Service-directed programs had a charter. Of these programs with a charter, 75 percent indicated that their charter was necessary and effective. Ninety-two percent of the programs without a charter indicated that a charter was not necessary. Sixty-three percent of all Congressionally-directed programs had a charter. Eighty percent of those programs with a charter indicated that it was both necessary and effective. Those programs without a charter were split half and half as to whether or not a charter would have helped in the management of the program.

The Congressionally-directed group of programs was the only group that preferred informal (57 percent) to formal (43 percent) cost sharing agreements. This was also the group least likely to document agreements with a MOA.

The greatest number of inter-Service agreements for OSD-directed (38 percent), Service-directed (34 percent), and Congressionally-directed (57 percent) programs were negotiated at the Service headquarters level. The second greatest number of inter-Service agreements for all the groups were negotiated at the Product Division/Commodity Command level. The JLC and JCS directed programs' agreements were negotiated at the JLC and JCS level.

<u>External Factors</u> - The rationales behind a decision to go joint were:

- Interoperability

- Cost Savings
- Interoperability and Cost Savings
- Other.

OSD- and Service-directed programs were the programs most likely to have performed a cost benefit analysis (15 percent and 12 percent respectively). Although none of the Congressionally-directed programs performed a cost benefit analysis, the rationale for jointness was cost savings (50 percent), and both interoperability and cost savings (50 percent). Service- and JLC-directed programs listed cost savings as the major reason for jointness. The JCS-directed program listed interoperability and cost savings both (49 percent) and cost savings (41 percent) as their rationales for jointness.

OSD, the JLC, and JCS designated the lead Services for the programs which they directed over 90 percent of the time. Congress and the Services designated the lead Service for programs which they directed less than 50 percent of the time. The criteria for selecting the lead Service was as follows:

- Greatest Need
- Largest Dollar Buy
- Prior Agreement
- Technological Capability Due to an Ongoing Effort
- Prior JLC Agreement
- Other.

The programs directed by Congress (50 percent), OSD (42 percent), the Services (72 percent), and the JLC (100

percent) chose the lead because of the technological capability of that Service due to an ongoing effort. The lead Service for the single JCS-directed program was chosen because it planned to spend the most money for the largest buy.

### D.5.3 <u>Execution</u>

<u>Internal Environment</u> - As indicated in Table D.5-3, the JLC-directed group of programs was the best staffed and the program managers were afforded the most authority to make trade-offs between cost, schedule, and performance, identify funding needs, and control the funds allocated. They also perceived that they were given more authority to determine and control hardware and software configurations and manage program office military and civilian personnel. However, these same program managers felt that they had more special controls placed on them.

The Service-directed group of program managers were afforded more authority, and they were subjected to more complex oversight reporting and coordination problems on average. The OSD-directed group of programs had less than average program manager authority, as well as complex oversight reporting and coordination problems.

<u>Effectiveness</u> - As depicted in Figure D.5-3, OSD-directed and Service-directed programs covered the entire spectrum of organizational structures. The organizatonal appropriateness and effectiveness measures, therefore, are not meaningful.

TABLE D.5-3

EXECUTION FACTORS

| | CONGRESS | OSD | JCS | SERVICES | JLC |
|---|---|---|---|---|---|
| **FUNDING** | | | | | |
| Cost Sharing Stability Index | 70% | 67% | 80% | 73% | |
| Cost Sharing Problems | 28% | 29% | 0.0 | 27% | |
| Funding Commitment, Lead | 7.3 | 6.9 | 9.0 | 6.9 | 8.0 |
| Funding Commitment, Service B | 6.3 | 6.6 | 9.0 | 7.0 | 7.0 |
| Funding Commitment, Service C | 7.3 | 6.3 | 9.0 | 4.5 | |
| External Funding Support | 7.0 | 8.0 | 9.0 | 6.7 | 9.0 |
| Internal Funding Support, Lead | 6.9 | 6.4 | 9.0 | 6.4 | 8.0 |
| Internal Funding Support, Service B | 7.0 | 6.2 | 9.0 | 6.8 | 7.0 |
| Internal Funding Support. Service C | 7.7 | 6.1 | 9.0 | 4.2 | |
| 3-Yr R&D Cost Turbulence | 30.5 | 45.3 | | 43.5 | 15.0 |
| 5-Yr R&D Cost Turbulence | 82.2 | 103.5 | | 91.1 | 212.5 |
| 3-Yr Production Funding Instability | 38.5 | 23.1 | | 23.4 | |
| 5-Yr Production Funding Instability | 65.3 | 141.8 | | 82.6 | |
| Cost Estimating Problems | 0.0 | 16% | 0.0 | 14% | |
| **INTERNAL ENVIRONMENT** | | | | | |
| Manning Levels, Lead | 8.4 | 8.5 | 10.0 | 8.0 | 8.0 |
| Manning Levels, Service B | 5.3 | 7.2 | 7.0 | 6.0 | 8.0 |
| Manning Levels, Service C | | 5.7 | 7.0 | 5.0 | |
| Program Manager Authority | 7.3 | 7.3 | 7.0 | 8.0 | 9.0 |
| Program Manager Limitations | 7.8 | 7.6 | 6.0 | 8.5 | 9.5 |
| Oversight Reporting | 7.3 | 6.9 | 9.0 | 8.5 | |
| **EFFECTIVENESS** | | | | | |
| Integrated Plan Execution Effectiveness | 7.0 | 7.7 | 9.0 | 8.3 | |
| Charter Effectiveness | 7.3 | 7.5 | 7.0 | 7.0 | |
| Organization Effectiveness | 7.1 | 7.1 | 7.0 | 7.3 | 7.0 |
| Acquisition Strategy Effectiveness | 7.6 | 7.1 | 8.0 | 7.1 | |
| Organization Approrpiateness | 7.5 | 6.9 | 7.0 | 7.3 | 7.7 |
| Cost Sharing Helped | 67% | 61% | 100% | 76% | |
| Configuration Mgt (Stability) | 7.0 | 7.1 | | 0.35 | 9.0 |
| Technical Req Resolution, Current | 3.4 | 3.1 | 4.0 | 4.1 | 3.0 |
| Charter Need | 71% | 79% | 100% | 33% | 0.0 |

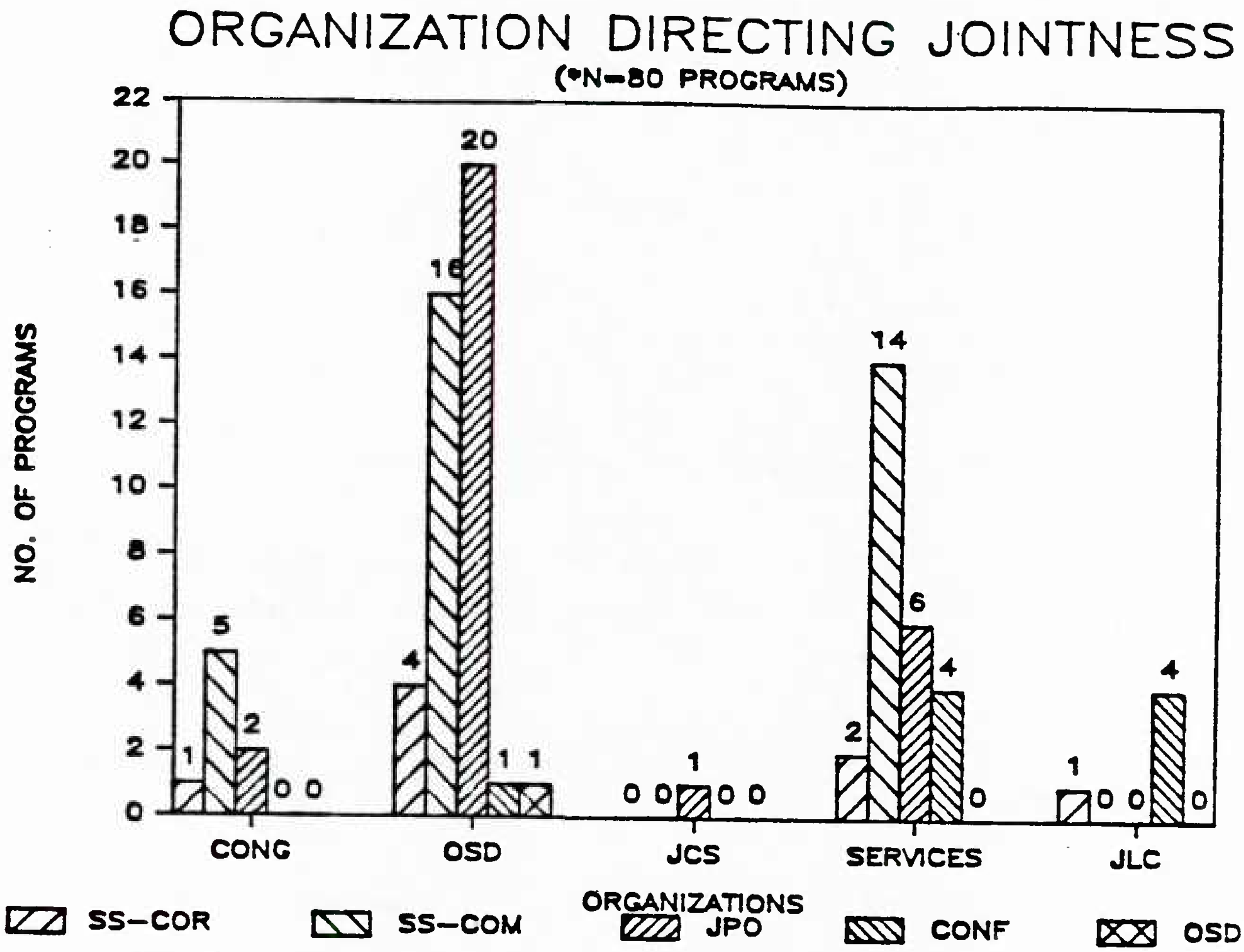


Figure D.5-7 Organizational Structure by which Organization Directed the Jointness

## D.5.4 Success

As indicated in Table D.5-4, OSD- and Congressionally-directed programs, as groups, experienced the least amount of selection and execution harmony. OSD- and Service-directed programs experienced the least amount of initiation harmony. The groups of programs that experienced the most selection and initiation harmony were those directed to go joint by the JLC. The JLC programs were also best able to control their R&D cost

TABLE D.5-4
SUCCESS FACTORS

| | CONGRESS | OSD | JCS | SERVICES | JLC |
|---|---|---|---|---|---|
| Initiation Success | 3.0 | 2.7 | 3.3 | 3.3 | |
| Execution Success | 2.4 | 2.4 | | 2.5 | |
| Compound Rate of R&D Cost Growth | 0.34 | 0.46 | | 0.30 | 0.06 |
| Compound Rate of Production Cost Growth | 0.05 | 0.13 | | 0.05 | 0.14 |
| Compound Rate of Schedule Slippage | 0.10 | 0.73 | | 0.13 | 0.06 |
| Selection Harmony | 2.8 | 2.6 | 3.0 | 3.6 | 3.7 |
| Initiation Harmony | 3.9 | 3.4 | 4.0 | 3.7 | 4.0 |
| Execution Harmony | 2.4 | 2.6 | | 2.8 | |

growth and schedule slippage. Service- and Congressionally-directed programs were best able to control their production cost growth.

## D.6 ACQUISITION PHASE

Programs in the data base can be segmented by the acquisition phase they were in when they became joint. It was important to distinguish between those programs that were joint from the outset and those that became joint later on during development or production.

As depicted in Figure D.6-1, 65 percent of all programs became joint during pre-full scale development (FSD), 24 percent during FSD, and 11 percent during production and development. OSD directed 63 percent of the pre-FSD programs to become joint, the Service directed 21 percent, Congress 10 percent, JLC 4 percent, and JCS 2 percent. The Services directed 54 percent of the development and production programs, OSD 32 percent, Congress 11 percent, JLC 3 percent, and JCS 0. As illustrated in Figure D.6-2, OSD directed programs to become joint earliest in their acquisition cycles.

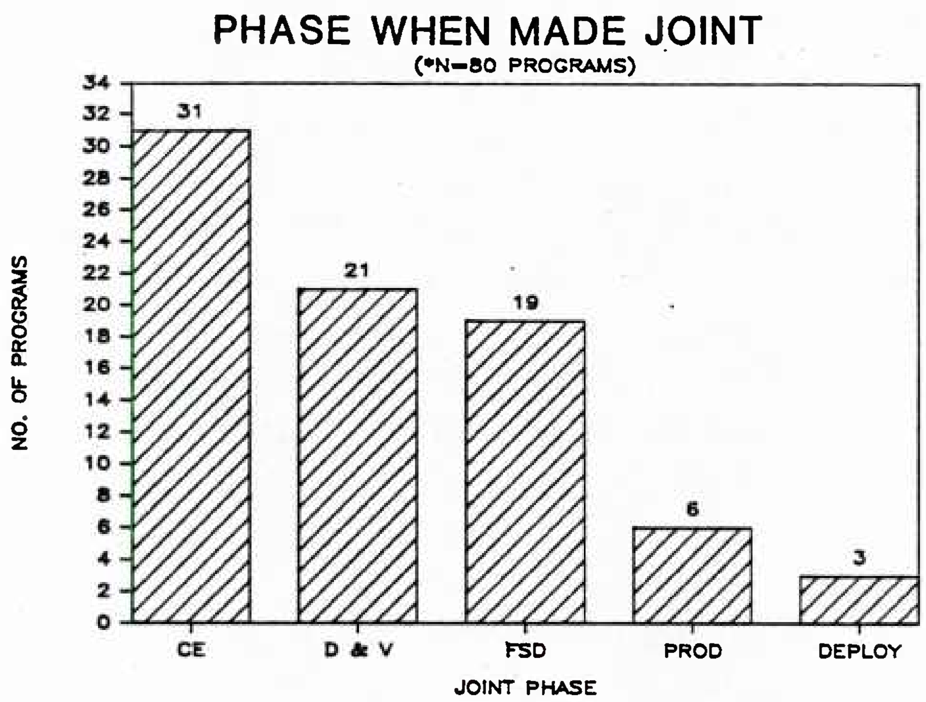


Figure D.6-1 The Acquisition Phase a Program Was in When It Became Joint

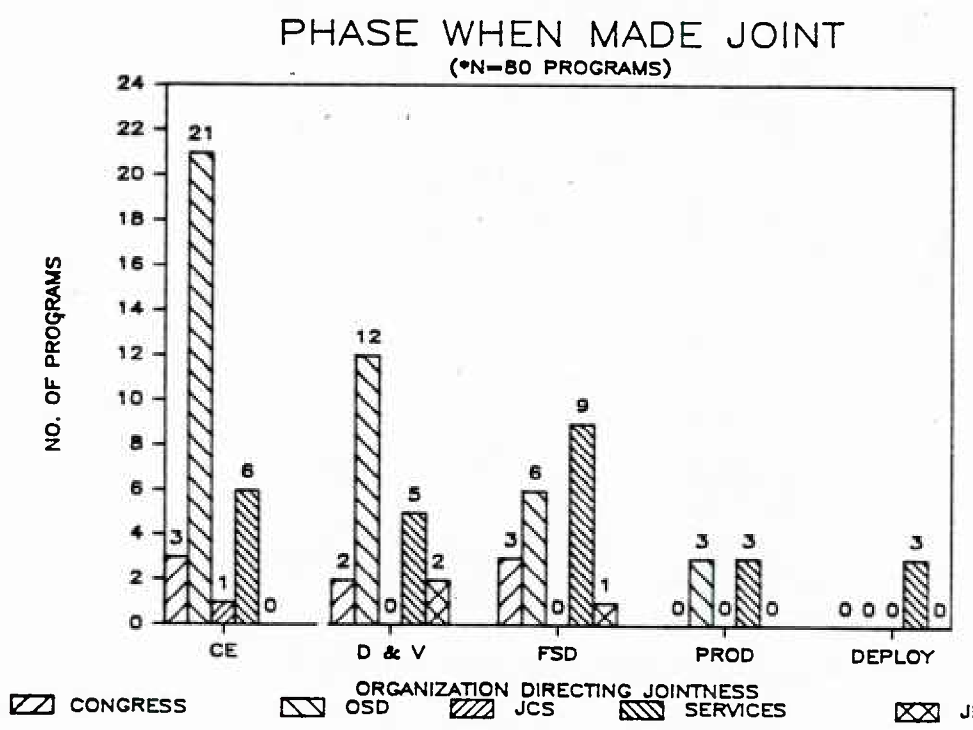


Figure D.6-2 Organization Which Directed Jointness and the Acquisition Phase It Was In

## D.6.1 Pre-Joint Environment

Prior effort on the part of the lead Services increases the longer a program waits to become joint. The same is not necessarily true for the participating Services. As indicated in Table D.6-1, the prior effort of the participants of a program which becomes joint during FSD is between 10 percent and 29 percent below the mean for all programs, probably indicating the joint-buy programs where a Service decides to buy another Service's product after it is well along in development.

TABLE D.6-1
PRE-JOINT ENVIRONMENT FACTORS

| | CE | D&V | FSD | PRODUCTION | DEPLOYED | ALL PROGRAMS AVERAGE |
|---|---|---|---|---|---|---|
| Prior Effort of Lead Service | 6.5 | 7.6 | 8.4 | 8.3 | 10.0 | 7.5 |
| Prior Effort of Service B | 6.1 | 6.2 | 3.9 | 5.5 | 3.7 | 5.5 |
| Prior Effort of Service C | 4.1 | 4.6 | 3.8 | | 7.0 | 4.2 |
| Point in Acquisition Cycle, Lead | 2.0 | 2.1 | 2.8 | 3.7 | 4.0 | 2.5 |
| Point in Acquisition Cycle, Service B | 2.0 | 1.7 | 1.5 | 2.0 | 0.0 | 1.7 |
| Point in Acquisition Cycle, Service C | 1.8 | 2.0 | 1.0 | | 4.0 | 1.7 |
| Documented Need of Lead Service | 73% | 80% | 94% | 83% | 100% | 83% |
| Documented Need of Service B | 73% | 79% | 53% | 83% | 100% | 70% |
| Documented Need of Service C | 38% | 60% | 40% | | 100% | 46% |
| Priority of Need of Lead Service | 1.8 | 2.0 | 2.0 | 2.0 | 1.0 | 1.9 |
| Priority of Need of Service B | 2.0 | 1.8 | 2.2 | 1.7 | 2.0 | 2.0 |
| Priority of Need of Service C | 2.3 | 2.4 | 1.8 | 1.0 | 2.2 | |

## D.6.2 Selection and Establishment Factors

Technical Factors - As shown in Table D.6-2 and Figures D.6-3 through D.6-7, the majority of the commodity programs that became joint during pre-FSD are $C^3I$ navigational equipment, munitions, technology, space, hand weapons, and ship programs. The majority of the other five commodities became joint during FSD or production.

TABLE D.6-2

WHEN THE COMMODITY BECAME JOINT

| PRE-FSD | COMMODITY | DEVELOPMENT & PRODUCTION |
|---|---|---|
| 25% | $C^3$I/Navigational Equipment | 13% |
| 21% | Component/Subsystems | 27% |
| 17% | Missiles | 20% |
| 8% | Munitions | 7% |
| 8% | Technology | 0 |
| 6% | Space | 3% |
| 4% | Ground Combat Vehicles | 7% |
| 4% | Hand Weapons | 3% |
| 4% | Aircraft | 10% |
| 2% | Ground Combat Support | 10% |
| 2% | Ships | 0 |

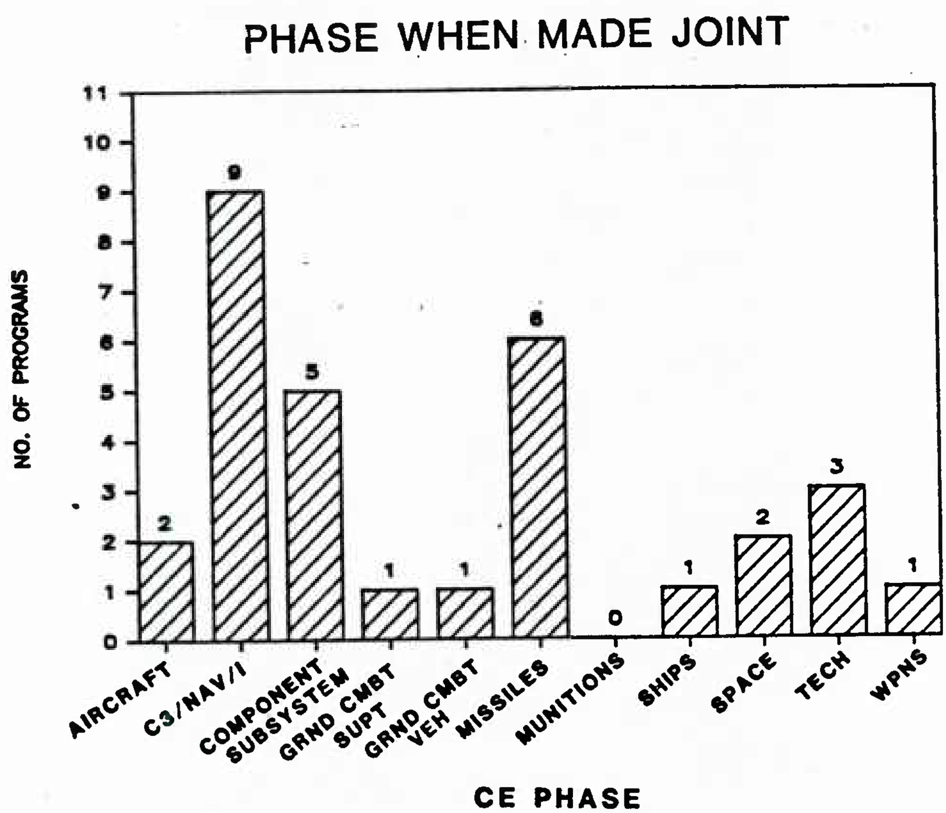


Figure D.6-3 Number of Programs Made Joint During CE Phase

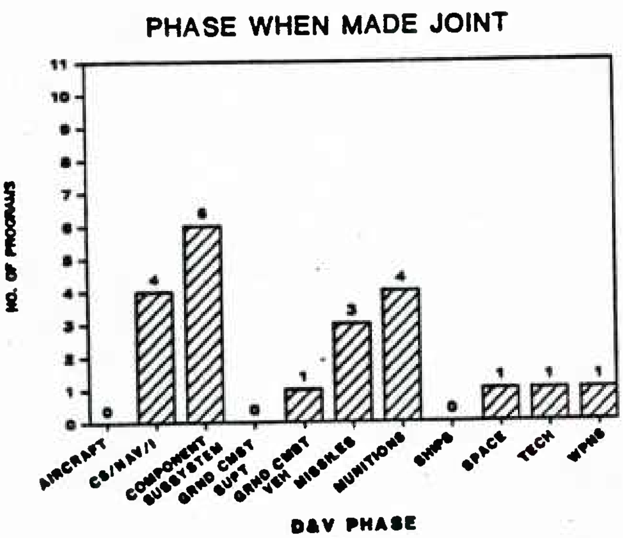


Figure D.6-4
Number of Programs Made Joint During D&V Phase

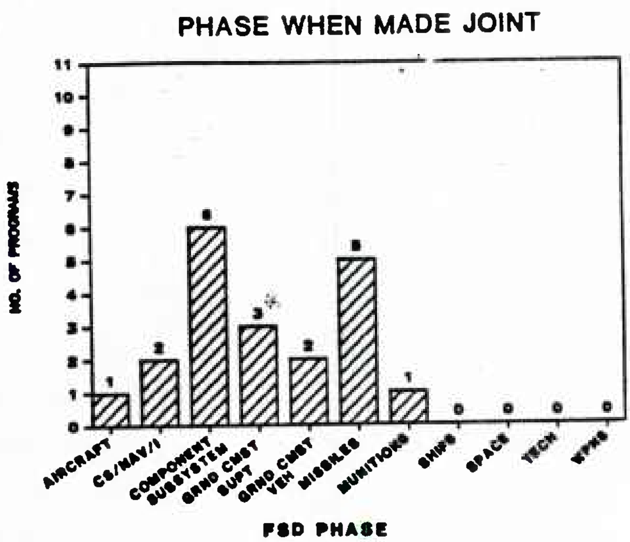


Figure D.6-5
Number of Programs Made Joint During FSD Phase

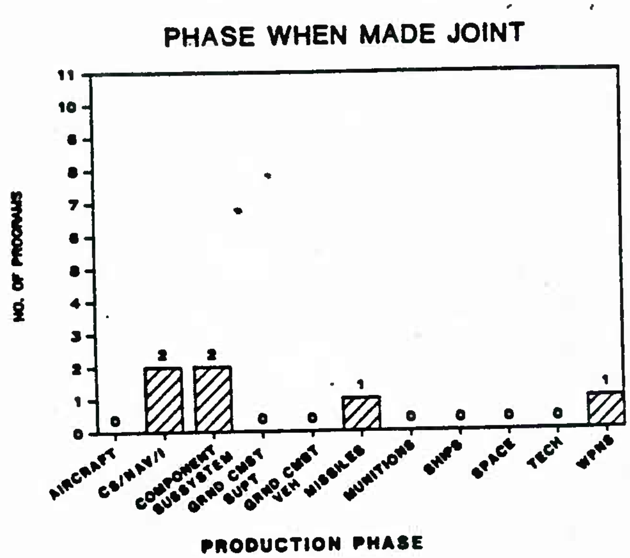


Figure D.6-6
Number of Programs Made Joint During Production

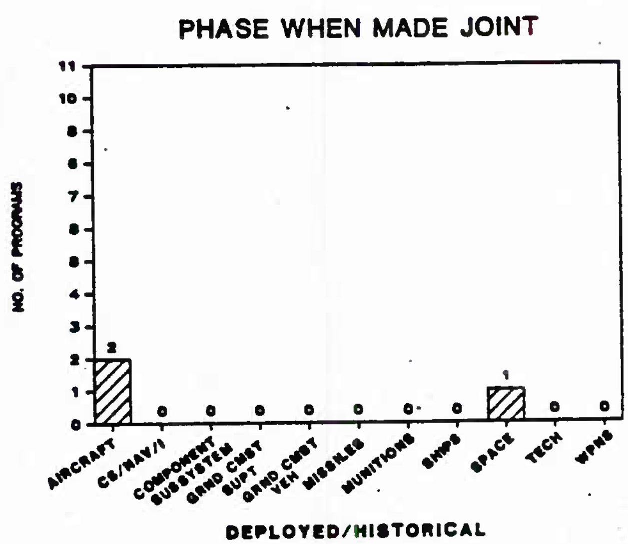


Figure D.6-7
Number of Programs Made Joint During Deployment

The more technically complex systems became joint during pre-FSD. Programs that became joint later in their acquisition cycles were less complex and required fewer compromises in technical requirements. Those programs that became joint during D&V had the most difficult time resolving their differences. Programs that became joint during FSD and production were able to resolve their requirements differences with the least amount of compromise.

Inter-Service Agreements - As indicated in Table D.6-3, programs that became joint during production were the most likely to have a charter and to have performed a cost benefit analysis. They were also the least likely to use formal cost sharing agreements. Fifty percent of the inter-Service agreements were negotiated at the Service headquarters level, 17 percent at the product division level, and 33 percent fell in the category of other.

Fifty-six percent of the programs that became joint during FSD had a charter, and seventy-five percent of those FSD programs with a charter expressed that it was necessary and effective. However, 71 percent of those without a charter stated that a charter was not necessary. This FSD group was the least likely to perform a cost benefit analysis and yet claimed that cost was the rationale for the jointness on 69 percent of the programs. Thirty-nine percent of the inter-Service agreements for the FSD programs were negotiated at the product division level, 28 percent by the Service headquarters, 11 percent by the JLC, and 22 percent fell into the category of other.

## TABLE D.6-3

## SELECTION AND INITIATION FACTORS

| | CE | D&V | FSD | PRODUCTION | DEPLOYED | ALL PROGRAMS AVERAGE |
|---|---|---|---|---|---|---|
| SCHEDULE AND COMMONALITY FACTORS | | | | | | |
| Timeliness Similarity Index | 10 Mo | 9 Mo | 9 Mo | 2 Mo | 1 Yr | 1 Yr |
| Timeliness Compromise Index, Lead | 1 Mo | 6 Mo | 1 Mo | 7 Mo | 0 | 3 Mo |
| Timeliness Compromise Index, Service B | 1 Mo | 5 Mo | 1 Mo | 7 Mo | 0 | 3 Mo |
| Timeliness Compromise Index, Service C | 2 Mo | 0 | 0 | 1 Yr | 0 | 2 Mo |
| Commonality Percentage | 91% | 91% | 81% | 92% | 78% | 87% |
| Commonality of Specifications | 86% | 76% | 74% | 93% | 80% | 81% |
| Roles & Missions Differences | 3% | 10% | 5% | 0 | 0 | 6% |
| TECHNICAL FACTORS | | | | | | |
| Technical Complexity | 6.1 | 6.2 | 4.9 | 5.2 | 6.7 | 5.8 |
| Technical Requirements Similarity Index | 79% | 79% | 81% | 100% | 98% | 79% |
| Technical Requirements Resolution, Initial | 3.3 | 3.1 | 3.9 | 4.7 | 4.0 | 3.5 |
| Technical Requirements Compromise, Lead | 3.5 | 3.6 | 4.1 | 4.6 | 4.5 | 3.8 |
| Technical Requirements Compromise, Service B | 3.5 | 3.7 | 3.9 | 4.7 | 4.0 | 3.7 |
| Technical Requirements Compromise, Service C | 3.8 | 2.8 | 4.3 | 4.0 | | 3.8 |
| INTER- AND INTRA-SERVICE AGREEMENTS | | | | | | |
| Charter Existence | 53% | 83% | 56% | 83% | 33% | 63% |
| Cost Benefit Analysis | 14% | 10% | 6% | 33% | 0 | 12% |
| Cost Sharing Agreement | 1.3 | 1.3 | 1.6 | 1.8 | 1.3 | 1.42 |
| Memorandum of Agreement | 71% | 70% | 61% | 50% | 100% | 68% |
| Inter-Service Agreements | 7.0 | 6.9 | 6.8 | 5.2 | 7.7 | 6.8 |
| Negotiation Level | 3.1 | 2.7 | 3.6 | 3.2 | 2.3 | 3.1 |
| EXTERNAL FACTORS | | | | | | |
| External Selection for Jointness | 77% | 67% | 47% | 50% | 0 | 63% |
| Rationale Index for Jointness | 2.1 | 2.4 | 2.5 | 1.3 | 3.0 | 2.27 |
| Basis for Selection of Lead Service | 3.5 | 3.4 | 3.4 | 2.8 | 4.0 | 3.42 |
| Designation of Lead Service | 2.5 | 2.3 | 3.2 | 3.4 | 3.3 | 2.70 |

A high percentage of the D&V programs (83 percent) had a charter and perceived it to be both necessary (93 percent) and effective. Sixty-eight percent of these programs used formal cost sharing agreements and 70 percent of the programs used MOAs to formalize inter-Service agreements. Forty-four percent of the inter-Service agreements for the D&V programs were negotiated at the Service headquarters level, 28 percent by the product division, 11 percent at either the Service Secretariat level or the JLC, and six percent were in the category of other.

Fifty-three percent of the programs that became joint during CE had a charter, 14 pecent performed a cost benefit analysis, and 67 percent used formal cost sharing agreements. Fifty-nine percent of the inter-Service agreements for this group were negotiated above the product division level.

The younger the program was when it became joint, the more likely it was to use a formal cost sharing agreement.

<u>External Factors</u> - Table D.6-4 lists the rationale behind a decision to go joint. Those programs that become joint during D&V or FSD listed cost savings as the predominant reason for jointness. Programs which become joint during CE or production listed both interoperability and cost savings as their reasons for jointness.

TABLE D.6-4

RATIONALE FOR JOINTNESS

| ACQUISITION PHASE | RATIONALE | PERCENTAGE OF PROGRAMS |
|---|---|---|
| CE | Interoperability & Cost Savings | 45% |
| | Interoperability | 6% |
| | Cost Savings | 39% |
| | Other | 10% |
| D&V | Interoperability & Cost Savings | 35% |
| | Interoperabiltity | 0 |
| | Cost Savings | 55% |
| | Other | 10% |
| FSD | Interoperability & Cost Savings | 26% |
| | Interoperability | 0 |
| | Cost Savings | 69% |
| | Other | 5% |
| Production | Interoperability & Cost Savings | 83% |
| | Ineroperability | 0 |
| | Cost Savings | 17% |
| | Other | 0 |

Once a program was slated to become joint, a lead Service had to be designated. OSD selected 63 percent of the pre-FSD programs for jointness and selected the lead Service for 67 percent of those joint programs. OSD selected 32 percent of the post-FSD programs for jointness and selected the lead Service for 39 percent of those joint programs. As indicated in Table D.6-5, the technological capability a Service obtained due to its previous efforts was the most often cited reason for selecting the lead Service.

TABLE D.6-5

BASIS FOR SELECTION OF LEAD SERVICE

| ACQUISITION PHASE | BASIS FOR SELECTING LEAD SERVICE | PERCENTAGE OF PROGRAMS |
|---|---|---|
| CE | Greatest Need for the End Item | 17% |
| | The Largest Dollar Buy | 13% |
| | Prior Agreement | 7% |
| | Technological Capability | 47% |
| | Prior JLC Agreement | 0 |
| | Other | 17% |
| D&V | Greatest Need for the End Item | 15% |
| | The Largest Dollar Buy | 10% |
| | Prior Agreement | 20% |
| | Technological Capability | 45% |
| | Prior JLC Agreement | 0 |
| | Other | 10% |
| FSD | Greatest Need for the End Item | 5% |
| | The Largest Dollar Buy | 21% |
| | Prior Agreement | 0 |
| | Technological Capability | 74% |
| PRODUCTION | Greatest Need for the End Item | 20% |
| | The Largest Dollar Buy | 20% |
| | Prior Agreement | 20% |
| | Technological Capability | 40% |

### D.6.3 Execution

Internal Environment - As indicated in Table D.6-6, as a program progresses through its acquisition cycle, the manning levels of all Service participants decrease, and the program managers are subjected to greater special controls and coordination problems. This could be a source of many of the joint program management problems, i.e., fewer people to work increasing management problems.

## TABLE D.6-6
## EXECUTION FACTORS

| | CE | D&V | FSD | PRODUCTION | DEPLOYED | ALL PROGRAMS AVERAGE |
|---|---|---|---|---|---|---|
| **FUNDING** | | | | | | |
| Cost Sharing Stability Index | 67% | 61% | 66% | 82% | 77% | 69% |
| Cost Sharing Problems | 44% | 35% | 81% | 0 | 0 | 34% |
| Funding Commitment, Lead | 7.1 | 6.7 | 6.6 | 7.0 | 8.7 | 7.0 |
| Funding Commitment, Service B | 6.2 | 7.3 | 6.6 | 8.2 | 6.7 | 6.8 |
| Funding Commitment, Service C | 6.0 | 7.5 | 6.2 | | | 6.2 |
| External Funding Support | 7.3 | 7.3 | 7.9 | 8.0 | 6.7 | 7.5 |
| Internal Funding Support, Lead | 6.2 | 6.5 | 6.3 | 7.5 | 8.7 | 6.5 |
| Internal Funding Support, Service B | 5.7 | 6.6 | 6.8 | 8.5 | 7.3 | 6.5 |
| Internal Funding Support. Service C | 5.9 | 9.0 | 6.0 | | 4.0 | 6.0 |
| 3-Yr R&D Cost Turbulence | 32.8 | 48.2 | 48.2 | 48.0 | 28.0 | 41.9 |
| 5-Yr R&D Cost Turbulence | 74.9 | 89.3 | 89.3 | 106.0 | 35.0 | 100.5 |
| 3-Yr Production Funding Instability | 28.8 | 21.8 | 21.8 | 18.0 | | 24.8 |
| 5-Yr Production Funding Instability | 87.6 | 146.38 | 146.4 | 133.7 | | 108.0 |
| Cost Estimating Problems | 8% | 13% | 13% | 0 | 0 | 13% |
| **INTERNAL ENVIRONMENT** | | | | | | |
| Manning Levels, Lead | 8.5 | 8.5 | 8.3 | 7.5 | 10.0 | 8.4 |
| Manning Levels, Service B | 7.1 | 6.9 | 6.2 | 5.2 | 8.0 | 6.7 |
| Manning Levels, Service C | 6.8 | 5.0 | 2.7 | | | 5.6 |
| Program Manager Authority | 7.3 | 7.5 | 7.8 | 8.0 | 9.0 | 7.5 |
| Program Manager Limitations | 7.6 | 8.0 | 8.2 | 8.3 | 9.0 | 7.9 |
| Oversight Reporting | 7.2 | 7.0 | 7.8 | 9.2 | 8.5 | 7.5 |
| **EFFECTIVENESS** | | | | | | |
| Integrated Plan Execution Effectiveness | 7.6 | 7.6 | 8.4 | 7.6 | 8.6 | 7.8 |
| Charter Effectiveness | 6.7 | 8.0 | 7.2 | 8.0 | | 7.4 |
| Organization Effectiveness | 7.1 | 6.9 | 7.6 | 6.3 | 9.0 | 7.2 |
| Acquisition Strategy Effectiveness | 7.4 | 6.2 | 7.7 | 7.5 | 7.0 | 7.0 |
| Organization Appropriateness | 6.9 | 7.1 | 7.79 | 5.5 | 8.0 | 7.1 |
| Cost Sharing Helped | 78% | 69% | 75% | 60% | 67% | 73% |
| Configuration Mgt (Stability) | 6.7 | 7.4 | 7.4 | 7.3 | 8.0 | 7.2 |
| Technical Req Resolution, Current | 3.1 | 3.0 | 3.9 | 4.7 | 4.0 | 3.4 |
| Charter Need | 60% | 83% | 53% | 50% | 33% | 63% |

Effectiveness - Programs merged during the earliest acquisition phase (CE) have the most trouble developing a functional charter. Their charters are 9 percent below the mean in effectiveness. Programs merged during D&V had the least effective organizations. This is further illustrated by the linear regressions in Figure D.6-8.

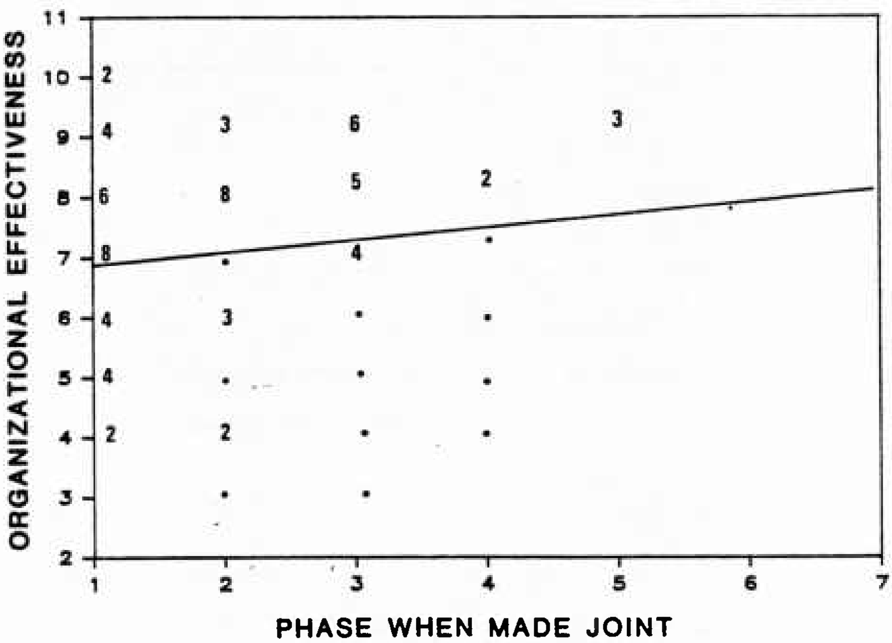


Figure D.6-8 Regression of Phase When Made Joint and Organizational Effectiveness

Sixty-seven percent of the programs merged during production and organized in either SS W/COMs or Confederated organizations were rated as inappropriate and ineffective.

## D.6.4 Success

As indicated by Table D.6-7, the greatest amount of R&D cost growth and schedule slippage occurred when a program

TABLE D.6-7
SUCCESS FACTORS

| | CE | D&V | FSD | PRODUCTION | DEPLOYED | ALL PROGRAMS AVERAGE |
|---|---|---|---|---|---|---|
| Initiation Success | 2.8 | 2.9 | 3.1 | 3.6 | 3.0 | 3.0 |
| Execution Success | 2.3 | 2.4 | 2.4 | 2.9 | 2.8 | 2.4 |
| Compound Rate of R&D Cost Growth | 0.20 | 0.98 | 0.21 | 0.07 | 0.01 | 0.36 |
| Compound Rate of Production Cost Growth | 0.06 | 0.11 | 0.13 | 0.02 | 0.22 | 0.10 |
| Compound Rate of Schedule Slippage | 0.12 | 1.4 | 0.12 | 0.18 | 0.09 | 0.40 |
| Selection Harmony | 2.7 | 2.9 | 0.34 | 3.5 | 4.0 | 3.0 |
| Initiation Harmony | 3.5 | 3.3 | 3.8 | 4.0 | 4.0 | 3.58 |
| Execution Harmony | 2.4 | 2.4 | 3.0 | 3.2 | 3.0 | 2.66 |

was merged during D&V. Whether it was merged earlier (CE) or later (FSD) does not appear to be significant. Programs merged during CE or production experienced the least and those merged during D&V or FSD experienced the most production cost growth.

Previously, in Figures D.2-12 and D.2-13, it was illustrated that there is a positive linear relationship between the harmony experienced during the selection and the initiation of a program and when that program became joint. Figure D.3-7 illustrated that there is a negative linear relationship between the technical complexity of a program and the amount of selection harmony experienced by a program. Since programs that become joint during pre-FSD were the most technically complex, it follows that they would experience less harmony during selection and initiation. Figure D.6-9 illustrates the positive linear relationship between what phase the program was in when it became joint and the level of initiation success it achieved. Since the least technically complex programs became joint later in their acquisition cycles, they were more likely to progress successfully through the initiation phase.

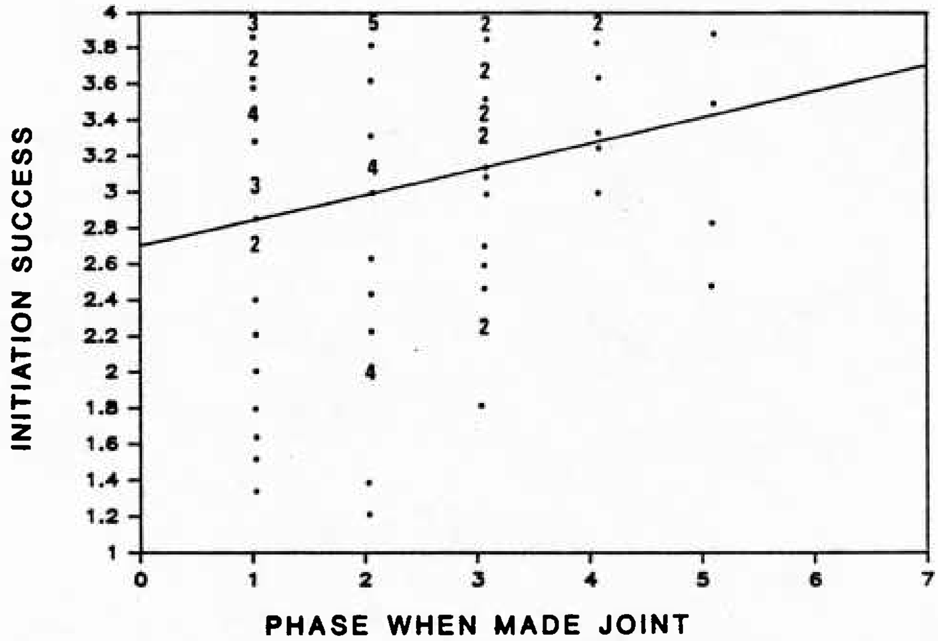


Figure D.6-9 Regression of Phase When Made Joint and Initiation Success

# APPENDIX E

# JOINT PROGRAM PERSONNEL STUDY

## JOINT PROGRAM PERSONNEL STUDY

### E.1 INTRODUCTION

Quality of personnel in terms of education and experience is a major concern of the Services at all levels. Each organization naturally strives to attract the best qualified people, but personnel with the appropriate skills and experience may not always be available. There exists a perception that this problem of getting the right personnel is worse in joint service programs because individual Services are reluctant to assign their best personnel to joint acquisition efforts. Staffing a joint program office (JPO) is made even more difficult because assignment to a joint office is often perceived as being detrimental to an officer's career. The notion persists in most Services that joint program assignments do not enhance (indeed inhibit) the career progression of officers. A third difficulty in staffing joint program offices centers around the problem of divided loyalties between the joint program and individual Service concerns. The dilemma for the Service member is protecting the interests of his or her Service while remaining dedicated to the success of the program.

The personnel portion of the Joint Program Study assesses whether these above perceptions are, in fact, widely held and compares the experience and quality of joint program personnel with single Service program personnel.

## E.2 METHODOLOGY

The methodology for investigating personnel aspects of joint acquisition programs was designed to assess the education, training, and experience level of joint program personnel and then to compare these findings with similar information on single Service program (SSPO) personnel. Personnel representatives from Air Force Systems Command (AFSC), Navy Materiel Command (NAVMAT), and US Army Materiel Development and Readiness Command (DARCOM) developed factors on acquisition experience and quality of force in terms of educational background and potential for promotion. Information on these factors was obtained from personnel records and then comparisons between joint program offices and single Service program offices were made.

In addition to these factors, the study team developed a personnel questionnaire. This questionnaire was administered to military officers currently assigned to joint program offices and evaluated the officers' perceptions of joint program assignments and how those assignments would affect their careers.

## E.3 ACQUISITION EXPERIENCE FACTOR

Acquisition experience was assessed by the total number of months an officer spent in an acquisition related job. This experience included acquisition assignments in both joint and single Service program offices.

### E.3.1 Air Force Personnel

Over 5,000 Air Force officers' records were reviewed. These records included both those officers assigned to joint program offices and those assigned to single Service program offices. The following acquisition management related Air Force specialities were considered:

| | |
|---|---|
| 26XX | (Scientific Manager) |
| 27XX | (Acquisition Management Officer) |
| 28XX | (Development Engineering) |
| 29XX | (Program Manager) |
| 30XX | (Communications-Electronics) |
| 51XX | (Computer Systems) |
| 55XX | (Civil Engineering) |
| 65XX | (Acquisition Contracting) |
| 67XX | (Financial Management) |

Officers assigned to the following joint program offices were evaluated:

| Air Force Lead | Navy Lead | Army Lead |
|---|---|---|
| ABRES/ASMS | AIM-7 | JTACMS |
| AMRAAM | AIM-9 | JTF |
| BISS | BIGEYE | |
| COBRA JUDY | CRUISE MISSILE | |
| COMBAT ID | HARM | |
| DMSP | | |
| DSCS | | |
| FIREBOLT | | |
| GPS | | |
| JSTARS | | |
| JTIDS | | |
| LLLGB | | |
| MAVERICK | | |
| MILSTAR | | |
| PLSS | | |
| TRI-TAC | | |
| WIS | | |

Identification of those officers assigned to joint program offices was somewhat difficult because all three Air Force product divisions (ASD, ESD, and SD) use matrix management. All officers with acquisition specialty codes were, therefore, selected and then these officers' names were correlated with personnel rosters from joint program offices to determine those officers working for joint offices. (Information on 2nd lieutenants through Lt. Colonels was available from the program offices. Information on Colonels was only available through the Service Officer Management Office at AFSC headquarters.) Single service program officer personnel were selected in the same manner at the same product divisions and with the same specialty codes.

### E.3.2 Navy Personnel

Over 270 Navy officers' records in grades 0-1 through 0-6 were reviewed. Officers assigned to the following joint program offices were evaluated:

| Air Force Lead | Navy Lead | Army Lead |
|---|---|---|
| AF Adv Tech | AIM 7/9 | H-60 |
| AMRAAM | ASPJ | |
| DARPA | ECX(E6) | |
| DMSD | EOD | |
| DSMC | GEOSAT | |
| GPS | HARM | |
| Space Based Radar | EW | |
| Space Test Program | JCMPO | |
| A-G Missiles | JVX | |
| IR-MAV | MK-19 Grenade Launcher | |
| HX | Space Test Program (N) | |
| JTIDS | SH-60 PMA | |
| Manned Space | Strat Comm | |
| MILSTAR | Support Aircraft | |
| TACAMO | H-53/46 | |
| SATCOM | | |
| WIS | | |

Again, specific identification of joint program office personnel was difficult because of matrix management. Few offices handled only one program and many dealt with both Navy and non-Navy lead programs.

### E.3.3 Army Personnel

Approximately 300 Army officers' records in grades 0-1 through 0-6 were reviewed. Acquisition experience was calculated in terms of the number of months of experience in a position coded for additional skill identifier (ASI) 6T (acquisition management). The 6T ASI is extremely narrow in scope and may not include acquisition associated experience in comptroller and logistics positions. The 6T skill code has only been in effect since the mid-1970s. All records were screened for other acquisition experience prior to 1970. The records reviewed, however, were exclusively from DARCOM and, therefore, did not include persons involved in acquisition for either Corps of Engineers construction projects or for the Army Surgeon General. This fact accounts, in part, for the relatively low number of years of acquisition experience on the part of Army personnel. Officers assigned to the following joint program offices were evaluated:

| Air Force Lead | Navy Lead | Army Lead |
|---|---|---|
| (None) | (None) | Joint TAC Fusion<br>LAV<br>M-113/Family of Vehicles<br>VIPER<br>TOW<br>HAWK<br>STINGER<br>HELLFIRE<br>SAT COM Agency |

## E.4 QUALITY OF FORCE FACTOR

The quality of force factor considered education and promotion potential. Education included both academic training and training at professional military schools, including Intermediate Service Schools, Senior Service Schools, and DSMC. The level of military education specifically assessed whether an officer had attended Basic Course, Advanced Course, Command and General Staff College (CGSC), or Senior Service College (SSC). A separate analysis was conducted on those Army officers whose education and experience made them eligible for a 6T position. Analysis of formal academic training assessed whether an officer had achieved a bachelors, masters, or doctoral level of education.

The promotion potential factor assessed the number of officers that received below-the-zone promotions. Information on below-the-zone (BTZ) promotions was only available for Air Force officers.

## E.5 FACTOR RESULTS

Service personnel practices differ; there are, therefore, substantial differences in the average years of acquisition experience for Army, Navy, and Air Force personnel assigned to program offices. When comparing the acquisition experience levels of personnel in joint and single service programs, however, there are no significant differences between joint and single Service programs. Table E.5-1 shows that in grades 0-1 through 0-6 there is only a 0.4 difference in years of acquisition experience and in a subset of the higher grades (0-4 through 0-6), the difference between joint and single Service program office personnel is only 0.1 years.

TABLE E.5-1

AVERAGE NUMBER OF YEARS ACQUISITION EXPERIENCE

| | Average # Years Acq. Experience JPO Personnel | # JPO Personnel | Average # Years Acq. Experience SSPO Personnel | # SSPO Personnel |
|---|---|---|---|---|
| Grades 0-1 through 0-6 | 3.8 | 1445 | 4.2 | 5270 |
| Grades 0-4 through 0-6 | 5.7 | 637 | 5.8 | 1796 |
| Program Managers | 9.4 | 31 | 10.1 | 38 |

In comparing JPO program managers with SSPO program managers, the difference in acquisition experience is slightly higher for SSPO program managers by 0.7 years. Again, this figure does not represent a significant difference in the acquisition experience level of joint versus single Service program managers.

Figure E.5-1 demonstrates that while there are no substantial differences between JPOs and SSPOs, there are inter-Service differences in the level of acquisition experience. Army military personnel have far fewer years of acquisition experience in both joint and single Service programs. This is, to a certain extent, a reflection of the different ways in which the Services conduct business. In the Army, acquisition management is not a full time occupation. In the Air Force and Navy, acquisition management is a primary specialty and occupation. It should be noted, however, that these differences are also partially due to the way in which information on acquisition experience was collected. The Air Force and Navy formally code a much wider range of positions as acquisition related. The jobs which the Army formally

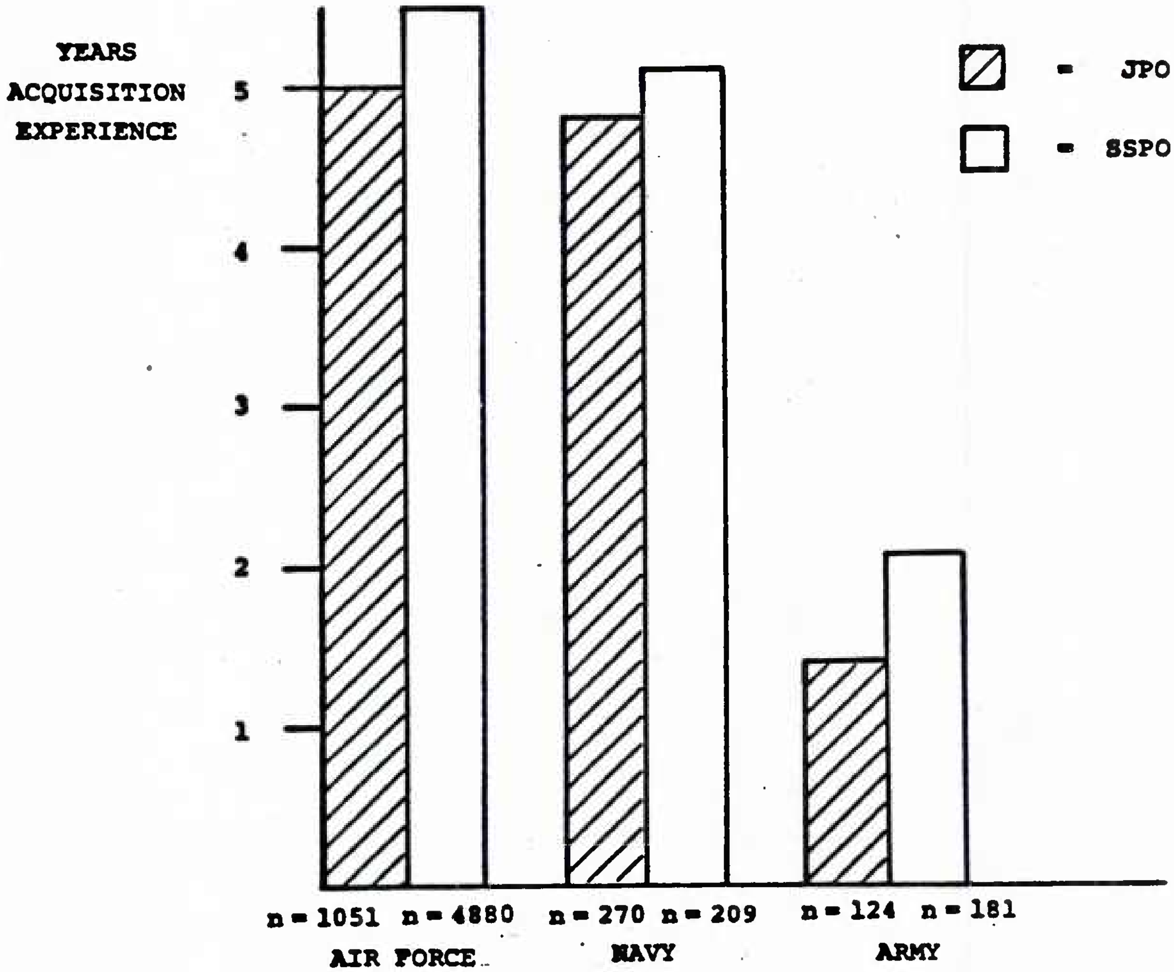


Figure E.5-1 . Years of Acquisition Experience for Military Officers in Program Offices

codes as acquisition related are much narrower in scope. It was possible, therefore, for an Army officer to have more acquisition experience than showed up on the record because of the Army job classification system.

As with acquisition experience, educational experience of officers varies slightly between the services. Comparisons were made, however, between joint and single program offices only. Table E.5-2 shows that there is no significant difference in the level of academic education between joint and single Service program office officers. The number of officer's holding doctorates was less than one percent in both joint and single Service program offices.

TABLE E.5-2

LEVEL OF ACADEMIC EDUCATION

| Category | Percent of JPO Personnel w/ Masters or Above | # JPO Personnel | Percent of SSPO Personnel w/ Masters or Above | # SSPO Personnel |
|---|---|---|---|---|
| Grades 0-1 through 0-6 | 55.3% | 1458 | 60.0% | 4278 |
| Grades 0-4 through 0-6 | 80.7% | 527 | 81.3% | 1892 |

Table E.5-3 shows that there are relatively insignificant differences between JPO and SSPO officers in terms of their professional military education. Navy officers appear to have attended professional military schools far less often. The Navy figures, however, include only in-residence attendants, whereas the Army and Air Force figures include those who "attended" by correspondence.

Promotion potential was measured in terms of the number of officers promoted below the zone. Due to the inaccessability of Army and Navy records, this portion of the analysis is based soley on Air Force studies. The percent of below-the-zone promotions for officers in grades 0-4 and 0-5 and for program mangers only was assessed for JPO and SSPO personnel. There are virtually no differences between joint and single Service program offices in any category as is shown in Table E.5-4.

TABLE E.5-3

PERCENT OF OFFICERS ATTENDING PROFESSIONAL MILITARY SCHOOLS

| School | % JPO Personnel Attended | # JPO Personnel | % SSPO Personnel Attended | # SSPO Personnel |
|---|---|---|---|---|
| DSMC | 25% | 669 | 19% | 1,891 |
| Senior Service School*† | 22% | 399 | 21% | 1,682 |
| Intermediate Service School*† | 70% | 399 | 80% | 1,682 |
| Intermediate & Senior Service School §π | 14% | 270 | 19% | 209 |

*Includes ICAF

†Includes figures for Army and Air Force only. Navy Records combined attendance at Senior and Intermediate Service School.

§Navy only.

πIncludes in-residence attendants only.

TABLE E.5-4

PERCENT OF OFFICERS PROMOTED BELOW THE ZONE

| Category | * JPO Personnel Promoted BTZ | # JPO Personnel | % SSPO Personnel Promoted BTZ | # SSPO Personnel |
|---|---|---|---|---|
| Grades 0-4, 0-5 | 7% | 318 | 6% | 1529 |
| Program Managers | 50% | 18 | 45% | 18 |

## E.6 QUESTIONNAIRE

The questionnaire was designed to elicit more subjective information from military personnel in joint program offices as to how the joint program assignment would affect their careers. Opinions were also solicited on the viability of joint programs and on the nature of the working environment in joint program offices. Specifically, questions were asked on the degree of isolation from the parent Service and on the amount of conflict between and within the Services. In addition, this information was collected in such a manner that differences in perception between lead Service and participating Service members could be assessed. Questionnaire responses were received from military personnel in the following 36 joint program offices:

| ARMY | NAVY | AIR FORCE |
|---|---|---|
| COMBAT ID | AIM-7 | AIM-7 |
| GPS/NAVSTAR | AIM-9 | AIM-9 |
| HELLFIRE | AMRAAM | AFSATCOM |
| JSTARS | ASPJ | AMRAAM |
| JTACMS | COMBAT ID | ASMS |
| 9MM HANDGUN | DMSP | ASPJ |
| PLRS | FMU-139 | BIS/SAFE |
| STINGER | GPS | COMBAT ID |
| VOLCANO | HARM | HARM |
| | JTIDS | JCMPO |
| | JVX | JSTARS |
| | PLRS | JTACMS |
| | | JTIDS |
| | | TRITAC |
| | | WIS |

Responses were not received from all joint programs in the study because many of the joint program offices were staffed primarily by civilian rather than military personnel. A total of 117 responses were included in this analysis. The number of responses by grade is shown in Figure E.6-1.

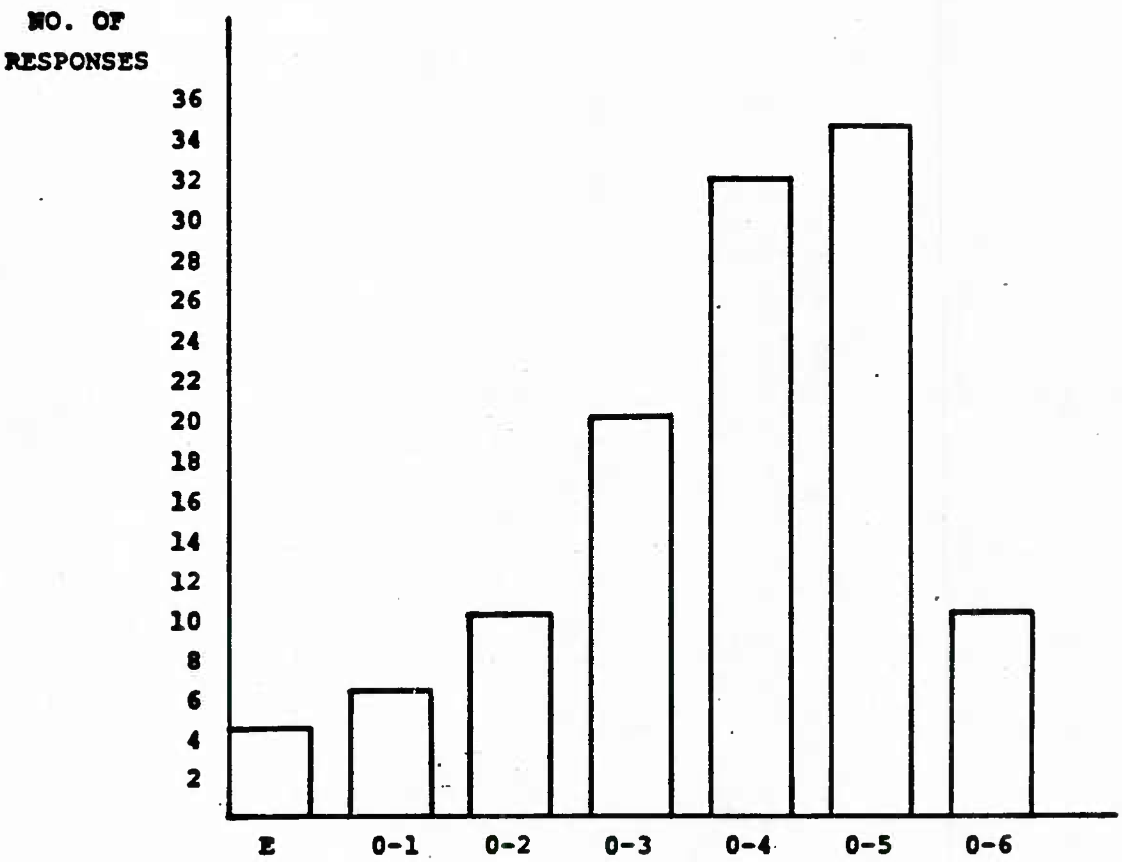


Figure E.6-1 Number of Responses by Grade

E.6.1 <u>Questionnaire Results</u>

Figure E.6-2 shows the responses to the question of how a joint progam assignment affects an individual's career. Of the 117 responses to this question, 10 percent said it had a detrimental effect, 30 percent said it had no effect at all, and 60 percent said it had a good effect. This breakout was the same for lead Service and participating Service military personnel. Figure E.6-3 shows responses to this same question broken out by Service.

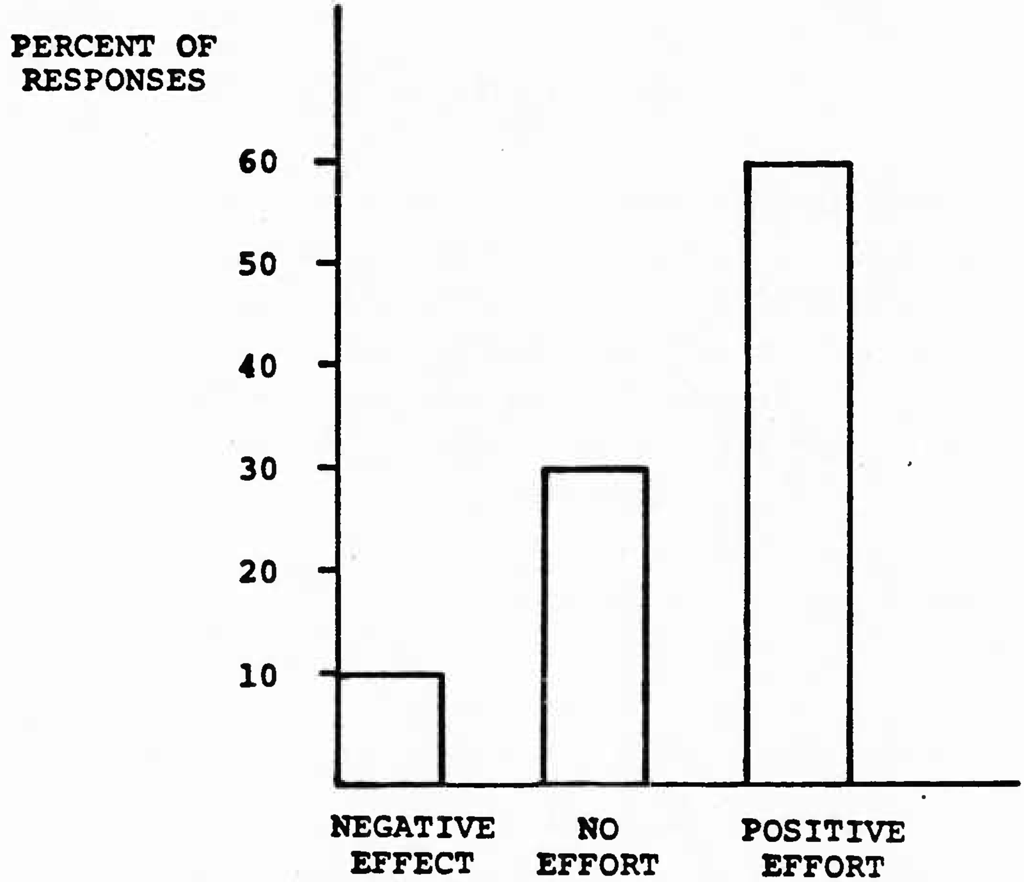


Figure E.6-2 Effect of Joint Program Assignment on Career

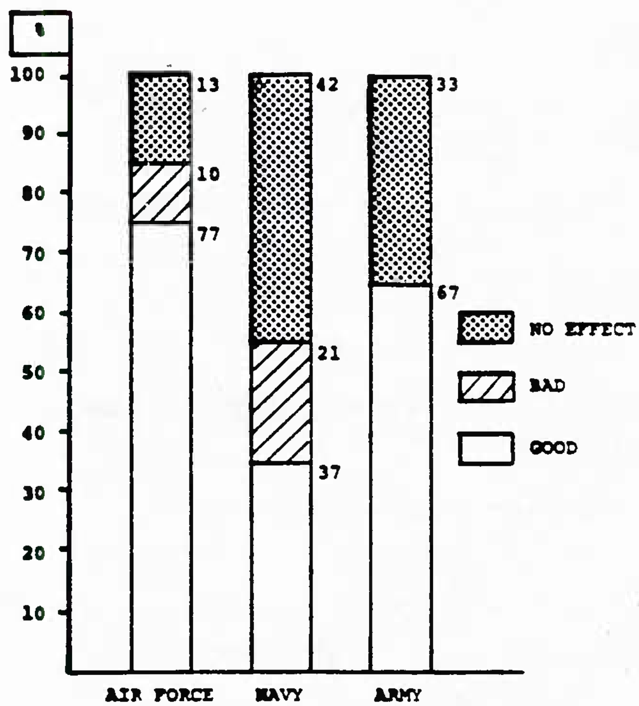


Figure E.6-3 Effect of Joint Program Assignment on Career by Service

The majority of both Air Force and Army personnel felt that joint program assignment had a positive effect on their careers. Only about one-third of Navy personnel, however, indicated that joint assignment was good for their careers. This supports the findings of the Defense Science Board that indicated that assignment of Navy personnel to JPO positions is viewed as limiting to career growth.

The comments most often associated with these perceptions are listed below.

- Negative Effect
  - -- Inter-Service Conflicts
  - -- Different Business Philosophies
  - -- Isolation from parent Service
  - -- Perception of being "tainted"
- No Effect
  - -- Outcome varies with program visibility
  - -- Depends on individual performance
- Positive Effect
  - -- Broadens skills and perspective
  - -- Provides understanding of how other Services operate
  - -- Increases visibility.

In terms of the working environment in JPOs, 20 percent of all respondants said that they felt isolated from their parent Service. This was true regardless of Service and irrespective of whether they were a member of the lead or the participating Service.

Figure E.6-4 shows how the respondants perceived conflict in the joint program. Of the 117 responses, 25 percent perceived no conflict at all, 33 percent perceived conflict between the Services at the Service level, and 42 perceived conflict between the Service members on an individual level.

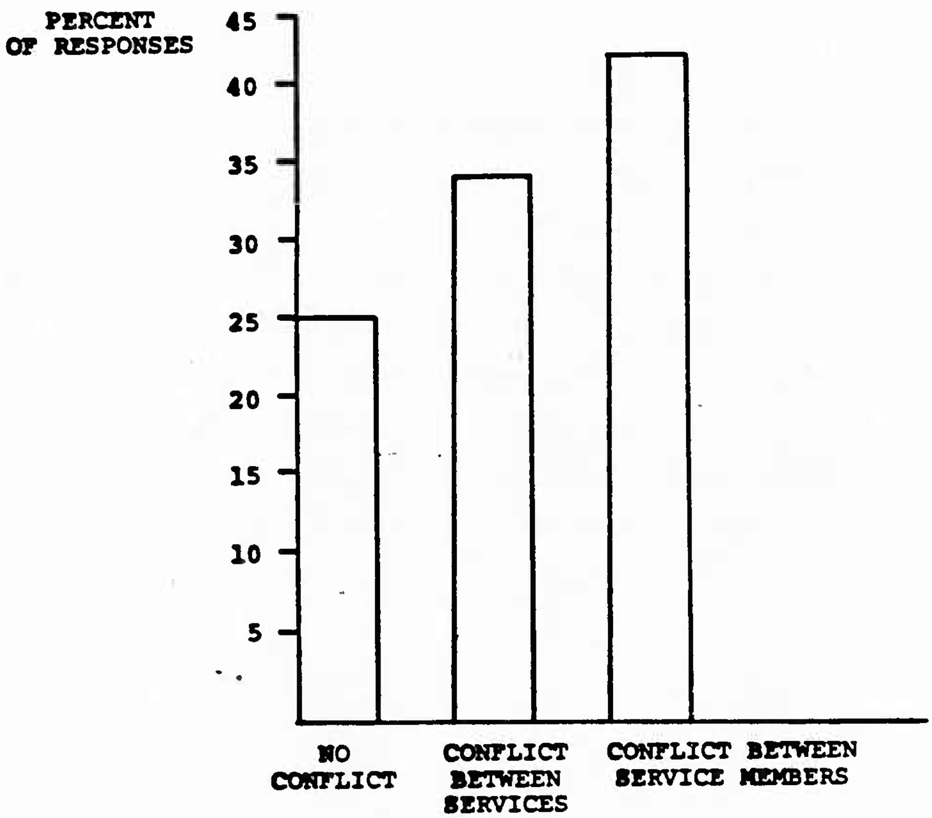


Figure E.6-4 Inter-Service Conflict in Joint Programs

This breakout was the same for both lead and participating Service personnel. Comments associated with these perceptions indicate that different business policies and requirements problems are the key reasons for the conflict at both the Service and the individual level.

Over 95 percent of all respondants indicated that the joint program concept is valid and workable. Despite inter-Service conflicts and isolation, military personnel in joint program offices feel overwhelmingly that joint programs are viable and necessary.

## E.7 SUMMARY

The data presented here does not support the perception that joint program offices are staffed with lesser qualified personnel. Joint program office military personnel are commensurate with single Service program office personnel in terms of acquisition experience, education, and professional military education. The perception that a joint program assignment is detrimental to a career seems to be unfounded. While there are feelings of isolation and inter-Service conflict, the joint program concept is overwhelmingly perceived to be valid and workable.

# APPENDIX F
# JLC PANEL STRUCTURE

## JLC PANEL STRUCTURE

### F.1 INTRODUCTION

#### F.1.1 Background

The Research and Development Sub-Panel of the Defense Science Board 1983 Summer Study on Joint Service Acquisition Programs delved beyond the realm of major weapon systems when considering candidates for joint programs. In particular, the sub-panel investigated establishing joint programs for technology programs and for programs that are at the "less-than-system" level or non-major programs.

The sub-panel found that with regard to technology programs there is substantial coordination in essentially all areas of mutual interest and a fair number of technology programs are already joint. This situation is due, in part, to the existence of a formal Joint Logistics Commanders (JLC) technology coordination process. This process works through the Joint Directors of Laboratories (JDL) at the two-star level immediately subordinate to the Commanders.

With respect to joint acquisition at the non-major program level, the sub-panel found that, where they exist, joint programs at the subsystem, equipment, and component level result in substantial economies and efficiencies. They noted, however, that there is no systematic mechanism for identifying and selecting programs at this level for jointness. The DSB recommended, therefore, that the Joint Logistics Commanders establish a formal mechanism to ensure methodical

review and selection of candidate subsystems, equipment, and components. Based on this DSB recommendation, the Joint Program Study initiated an ancillary study effort to explore various mechanisms that would serve as "catalysts" for jointness in non-major programs. The purpose of this sub-group was to develop a process for identifying joint opportunities at the subsystem, equipment, and component level, thereby reducing costs and increasing program effectiveness.

### F.1.2 Definitions and Assumptions

For purposes of this study, a non-major program was defined in accordance with the definition used for the main study effort. Two kinds of equipment fall into this category: small "stand-alone" systems for which there is a requirements document (i.e., GATOR, COMBAT ID), and components and subsystems of major programs that have no requirements document. To satisfy this requirement, the sub-group specifically looked for mechanisms not associated with the requirements process, focusing instead on developing a mechanism involving the materiel developers themselves. An example of such an item would be an aircraft engine or radar. While there is certainly a requirement for the total aircraft, a using command rarely generates a separate requirements document for the radar or the engine. These items, then, would come under the auspices of a JLC jointness catalyst organization.

The sub-group also imposed several limitations that served to narrow the focus of their study. Primary emphasis for identifying catalyst mechanisms was limited to the demonstration and validation (D&V), Full Scale Engineering Development (FSED), and Production phases of the acquisition cycle. This decision was based on the DSB finding that prior to demonstration and validation (6.3) there are adequate mechanisms (such as the JDL) to encourage jointness in the technology

base. Post-deployment mechanisms were also considered to be adequate because existing JLC groups (such as the Joint Policy Coordinating Group on Depot Maintennce Interservicing) have responsibility for identifying and executing joint opportunities wherever possible.

A second assumption was that the opportunity for jointness could occur at any point in the life cycle. For example, the opportunity to explore joint acquisition and interservicing of CFM-56 engines between the Air Force and the Navy arose after source selection for the Navy E-6A TACAMO system was complete. Only after the winning design was chosen, did it become apparent that this engine was largely common with the engine of the Air Force KC-135R. It was, therefore, appropriate to consider jointness at this point in the acquisition cycle.

A third assumption was that no single mechanism for establishing jointness at the non-major program level could stand alone. No one method was seen as being sufficiently capable of identifying all jointness opportunities in all functional areas. The sub-group concluded, therefore, that a matrix approach was required, whereby a number of JLC panels would have responsibility for investigating joint opportunities.

### F.1.3 <u>Current Situation</u>

At any given time, approximately 60 JLC panels and groups exist. Some of these groups are intended to continue indefinitely, such as the Joint Policy Coordinating Group on Depot Maintenance Interservicing. Many, however, such as the group that prepared this report, are established to work on an immediate problem for a period of up to 24 months and then

disband. With the exception of the JDL, no other JLC group involves commanders directly subordinate to the JLC.

In general, the method of identifying subject areas for JLC action is somewhat ad hoc; only when a topic is specifically brought to the Commanders' attention, is a special task force formed to address the problem in question. There is, however, a JLC Action Team chartered to identify opportunities for joint approaches to JLC activities. Figure F.1-1 summarizes Action Team projects. The Action Team has had several outstanding successes, in particular the recommendation to form the H-60 Joint Service Program Managers' Group.

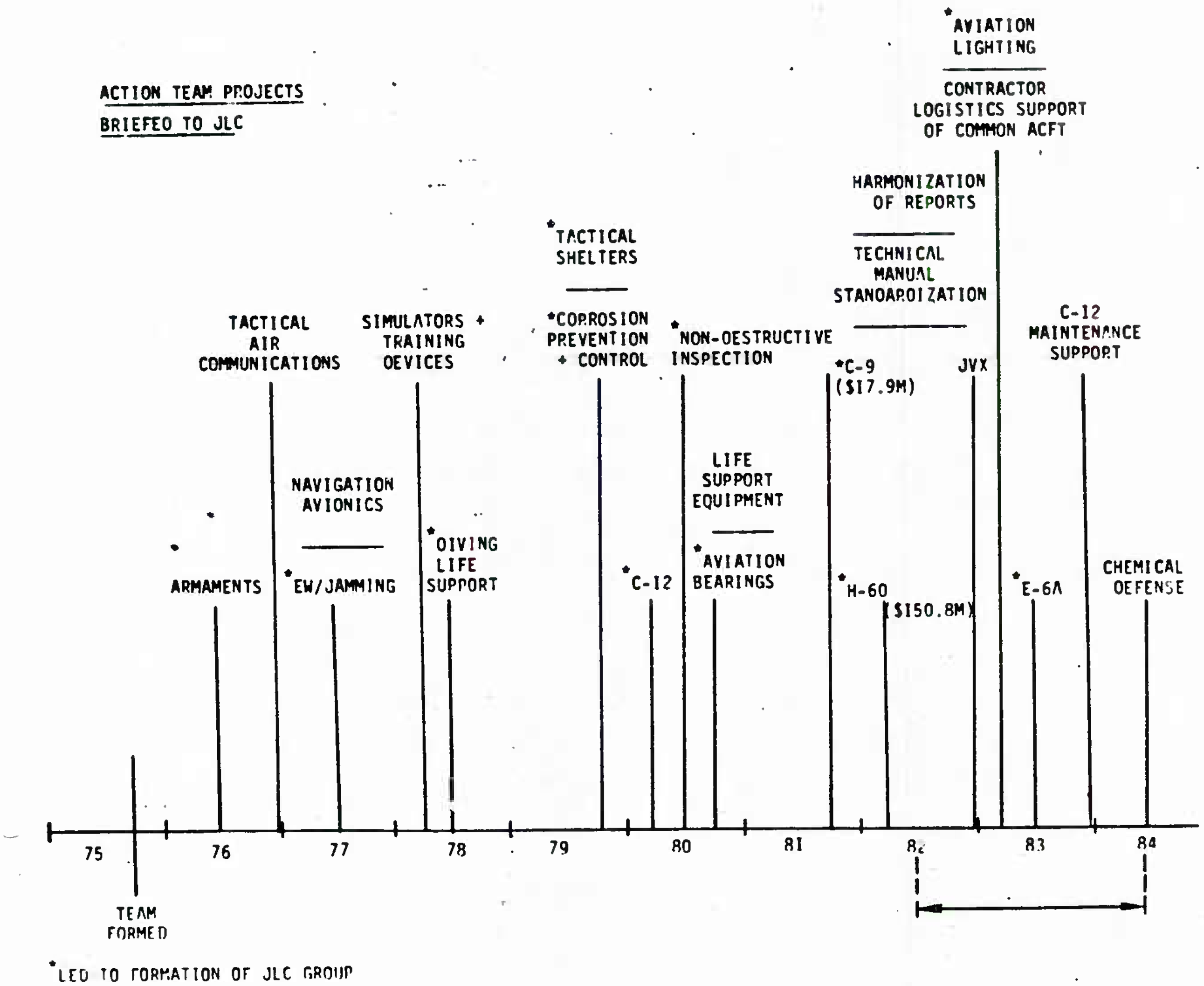


Figure F.1-1 Action Team Projects

At best, however, the Action Team can address four topics a year. More often the annual number of topics has been three. Opportunities for jointness are, therefore, undoubtedly missed and the need for additional mechanisms to consider jointness is clear.

### F.1.4 Approach to the Problem

As the sub-group analyzed its objective, two major themes became apparent. One theme dealt with the question of what panels or groups are needed to adequately explore opportunities for jointness. On what issues should JLC organizations focus in order to ensure that all opportunities for jointness are identified? This theme required, in turn, a thorough analysis of all JLC activities. The second thrust of the study dealt, therefore, with assessing the internal structure and operation of all currently existing JLC panels and groups to determine the ways in which those groups had failed or succeeded in identifying joint opportunities. Section E.2 explores in depth currently existing JLC panels and groups and proposes alternative organizations to better identify joint program candidates. Section E.3 presents the results of a review of panel and group operations and section E.4 presents conclusions and recommendations.

## F.2 SYSTEMATIC APPROACH TO PANELS AND GROUPS

### F.2.1 Perspectives in the Acquisition Community

The acquisition and life-cycle support community is responsible for a large variety of functions. Personnel within this community possess expertise in widely differing

areas of knowledge and use this expertise to focus on acquisition issues from a variety of different perspectives. These perspectives or points of view can be organized into seven categories. The first category is grouped according to commodity, such as munitions or aircraft. Major commodities are outlined in MIL-STD 881 on Work Break-down Structures (WBS). The second category views the acquisition environment in terms of technology, such as electro-optics, and the third category focuses on mission area as its primary perspective. The universe of acquisition can also be viewed by functional area, such as test and evaluation, engineering, or logistics. The fifth category looks at acquisition in terms of phase of development and the sixth segments the environment by industry or manufacturing group. The last category is an eclectic approach that combines the six perspectives enumerated above.

### F.2.2 Current Groups with Responsibility for Identifying Joint Opportunities

Current JLC panels and groups are presently organized only by commodity, technology, or manufacturing group. Of these panels and groups, the only one that comes close to being organized at the subordinate command level is the Joint Directors of Laboratories (JDL) panel. The JDL can, of course, address only those opportunities for jointness that occur in the technology base. Another JLC group, the Action Team, employs an eclectic approach as discussed above and, therefore, can identify opportunities for jointness across all areas. The only limitation on the ability of the Action Team to identify these opportunities is the size and scope of its knowledge base. Yet another group is the newly chartered Joint Requirements Management Board (JRMB). This group is chartered at the JCS level and is tasked to identify joint opportunities during the requirements determination phase. The perspective of the JRMB is, therefore, grouped in the

phase of development category. There are also a number of different OSD and ad hoc groups that work in the joint Service arena and that duplicate the functions of some of the JLC Panels. These OSD groups, such as the Armament/Munitions Requirements and Development (AMRAD) committee, are organized by commodity and technology. Outside of the Services there are also groups of industry associations that work to identify joint opportunities. Their perspective is generally limited to a particular mission area such as $C^3I$ or to a particular technology or industry. Figure F.2-1 shows a matrix of the existing groups and the perspective from which they operate. This figure demonstrates that <u>in the current environment there are voids or areas not being considered for jointness</u>, <u>and the development of alternatives is clearly indicated</u>.

POINTS OF VIEW

| EXISTING GROUPS (MECHANISMS) | COMMODITY | TECHNOLOGY | MISSION AREA | FUNCTIONAL AREA | CHRONOLOGY | PHASE OF DEVELOPMENT | INDUSTRY/MFR | ECLECTIC |
|---|---|---|---|---|---|---|---|---|
| JLC PANELS/GROUPS | X | X | | | | | X | |
| JLC SUBORDINATES | | X | | | | | | |
| JLC ACTION TEAM | | | | | | | | X |
| JRMB | | | | | | X | | |
| OSD GROUPS | X | X | | | | | | |
| INDUSTRY ASSOCIATIONS | X | | X | | | | X | |

Figure F.2-1 Existing Mechanisms for Identifying Joint Opportunities

### F.2.3 Alternative Solutions

The matrix of existing groups and points of view clearly shows that opportunities exist to implement new alternatives. This section describes the various alternatives and presents the characteristics of each alternative.

The first alternative proposed to ensure that all opportunities for jointness are identified was for the JLC to organize a panel for each commodity and technology. A second alternative is for the JLC to charter their subordinate commanders to work with each other to identify joint program candidates within their commodities of responsibility. This would entail the establishment of six or seven groups, composed of System Command Commanders and structured similarly to the JLC, whose specific responsibility would be to initiate joint programs. A third alternative is to expand the JLC Action Team. Other alternatives, such as organizing JLC panels for each mission area or requiring inter-command participation in source selections and program reviews to identify common subsystem and component applications, are listed in Table F.2-1. This table displays, in matrix form, the various alternatives and the advantages and disadvantages or characteristics of each option. If an alternative possesses the characteristic listed on the left of the table, it is given a "Y" for yes. If it does not possess this characteristic, it is given an "N" for No. "M" indicates that the characteristic only marginally applies and "NA" means that it is not applicable.

TABLE F.2-1

CHARACTERISTICS OF ALTERNATIVE SOLUTIONS

| ADVANTAGES/ DISADVANTAGES | ALTERNATIVES | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Panels For All Commodities | Panels For All Technologies | Charter Subord. Cmdrs | Expand Action Team Type Activity | Mission Area Groups | JointSvc. Particip. In Source Selection | JLC Rev. Of Joint Programs --- | Panels All Functl. Areas | Coord. POM Formulation | Milestone Oriented Panels --- | Formalize Joint Svc. Rev. Of R&D Programs | JLC Assume Functions Of OSD Groups | Add DLA Member To Appropriate Panels |
| Systematic | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | N | N |
| Existing Personnel | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Selectivity | N | N | Y | Y | N | N | N | N | N | N | N | N | Y |
| Bureaucratic Layering | Y | Y | Y | N | Y | N | Y | Y | Y | Y | Y | N | Y |
| Greater Depth of Knowledge | M | M | Y | M | M | M | M | M | M | NA | NA | Y | NA |
| Address Up-Front Opportunity | N | Y | Y | Y | Y | Y | M | M | M | NA | NA | NA | N |
| Address Opportunity To Use Fielded Systems | Y | N | Y | Y | Y | M | M | M | M | NA | NA | NA | Y |
| All Points Of Review | N | N | Y | N | N | N | N | N | Y | N | N | NA | NA |
| Opportunity Easily Discernable | NA | M | Y | N | M | M | M | M | M | N | M | NA | M |
| Related To Requirement Issue | NA | NA | NA | NA | Y | NA | NA | NA | NA | NA | NA | NA | NA |
| Limited Time Of Four Stars | NA | NA | NA | NA | NA | NA | Y | NA | NA | NA | NA | NA | NA |
| Duplicate Other Reviews | NA | NA | NA | NA | NA | NA | Y | NA | NA | NA | NA | NA | NA |
| Very Few Joint Programs Involve All JLC Members | NA | NA | NA | NA | NA | NA | Y | NA | NA | NA | NA | NA | NA |
| POM Process Too Hectic | NA | NA | NA | NA | NA | NA | NA | NA | Y | NA | NA | NA | NA |
| Different Line Item Descriptions Among Services | NA | NA | NA | NA | NA | NA | NA | NA | Y | NA | NA | NA | NA |
| OSD Approval Necessary | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | Y | NA |
| Direct Resolution | NA | NA | M | NA | NA | NA | M | NA | M | NA | NA | N | NA |
| Increase Commitment | N | N | Y | Y | N | N | N | N | N | N | N | NA | NA |

Of all the alternatives considered, the two most viable options seemed to be chartering subordinate commanders' groups and expanding and rechartering the JLC Action Team. While expanding the JLC Action Team would increase its manpower and knowledge base, it might also reduce cohesiveness within the team. In addition, further expansion of the commanders' personal staffs would be likely to draw criticism even if it allowed them to undertake additional projects. The benefits of an Action Team approach can be realized without adverse effect, however, if the JLC charters its subordinate

commanders to create their own action teams. Each subordinate commander would then have his or her own action team to identify joint program candidates within his or her own command. The existing JLC Action Team could then continue to concentrate on problems such as procedural issues that cut across the subordinate commands.

Chartering the JLC subordinate commanders to identify joint opportunities emerged as the most promising alternative and it was, therefore, explored in greater detail. The subordinate commanders are organized basically by commodity (WBS level one). These commodities are aircraft, ordnance, electronics, space, missiles, vehicles, and ships. Figure F.2-2 shows the universe of JLC efforts. The matrix lists the commodity commands across the top. Items from WBS level two or three as well as some functional items are listed down the left side of the matrix. Within the matrix are the JLC groups and panels previously outlined in section F.2.2. This figure shows that existing JLC groups are concentrated in the areas of manufacturing, depot maintenance, and spares and supply, and that even within these areas, coverage is neither systematic nor complete. Some significant areas such as propulsion, contracts, and procurement are not covered at all. These voids support the DSB conclusions that currently no sytematic mechanism exists to identify and select programs for jointness and that there is a need to establish such a mechanism.

| | COMMODITIES | | | | | | |
|---|---|---|---|---|---|---|---|
| CONCERNS | A/C | ORD. | ELECT. | SPACE | MISSILES | SURFACE VEHICLES | SHIPS |
| LIFE SUPPORT | OBOG, LSE* | (LSE) | LSE | LSE | | | LSE |
| SUPPORT EQUIPT. | AGSE, TSAS | | TSAS | | | TSAS | |
| TRAINING SYST. | STO | | (STO) | | | (STD) | (STD) |
| SURVIVABILITY | AS | JCAP, MS | | | | | |
| PROPULSION | JEW | | | | | | |
| GUIOANCE COMM. NAV, ELECTRONICS, ETC. | JTIOS, HF | | HF, TAC. RAOAR, EW | HF | (HF) | HF | HF |
| ELECTRONIC WARFARE | EW | (EW) | EW | (EW) | EW | EW | EW |
| CORROSION CONTROL | CPC | CPC | CPC | (CPC) | CPC | CPC | CPC |
| STRUCTURE | COMP. | JCAP | | | | | |
| TEST EQUIPMENT | AT, MC, NDI, AB | AT, MC, NDI | AT, MC, NDI | AT, MC, NDI | AT, MC, NDI | AT, MC, NDI | AT, MC, NDI |
| SPARES/SUPPLY | DIMM, NHS | JCAP, DIMM, NHS | OIMM, NHS | OIMM, NHS | OIMM, NHS | DIMM, MVR | DIMM, NHS |
| OEPOT MAINT. | WIOS, OMI, AB | WIOS, (JCAP), (OMI | WIOS, OMI | (WIOS), (OMI) | (WIOS, OMI) | WIDS, OMI | (WIOS), (DMI) |
| TEST & EVAL. | ATTT | ATTT, (JCAP) | | | ATTT | ATTT | ATTT |
| MANUFACTURING/ INOUSTRIAL BASE | STPE, OPT., MC, GR, FO, HP, DPA | STPE, JCAP, GR, OPT., MC, FD, DPA | STPE, OPT., MC, GR, FD, DPA | DPT., (STPE), (GR) FO, DPA | (STPE), MC, FO, DPA, | STPE, FO, OPT. DPA, MC, GR, (HP) | (STPE), (OPT.), MC, GR, FO. DPA |
| CONTRACTS/PROCUREMENT | | JCAP | | | | | |
| ELECTRICAL SYSTEMS | A/C WIRING* | | | | | | |
| SENSORS | MCT, TIS | TIS | MCT, TIS | MCT, TIS | | | (TIS) |
| COMPUTATIONAL SYSTEMS | CRM | CRM | CRM | CRM | CRM | CRM | CRM |
| ARMAMENT | MO | JCAP, ME, MO | | | | MO | MO |
| RELIABILITY, MAINTAINABILITY | | (JCAP), (ME) | | | | | |
| PROG. MGT. | H-60, C-12, E-6/ E-3, C-9, ILS | JCAP), ILS | ILS, JTIOS, TAC-RAOAR | ILS | ILS | ILS, MVR | ILS |

Figure F.2-2 Commodities and Concerns Matrix

## F.3 PANEL AND GROUP OPERATIONS

### F.3.1 Methodology

The sub-group's goal in investigating the operations of JLC panels and groups was to identify factors critical to success. Five initial interviews were conducted with individuals familiar with the JLC arena. These included a general officer (OPR), two panel chairmen, and two members of one of the Joint Secretariat offices. The interviewees were asked to identify those factors that contributed to the success of a panel and those that impeded it. These initial interviews led to the development of a conceptual model (Figure F 3-1) that describes factors that affect a JLC panel. As with many

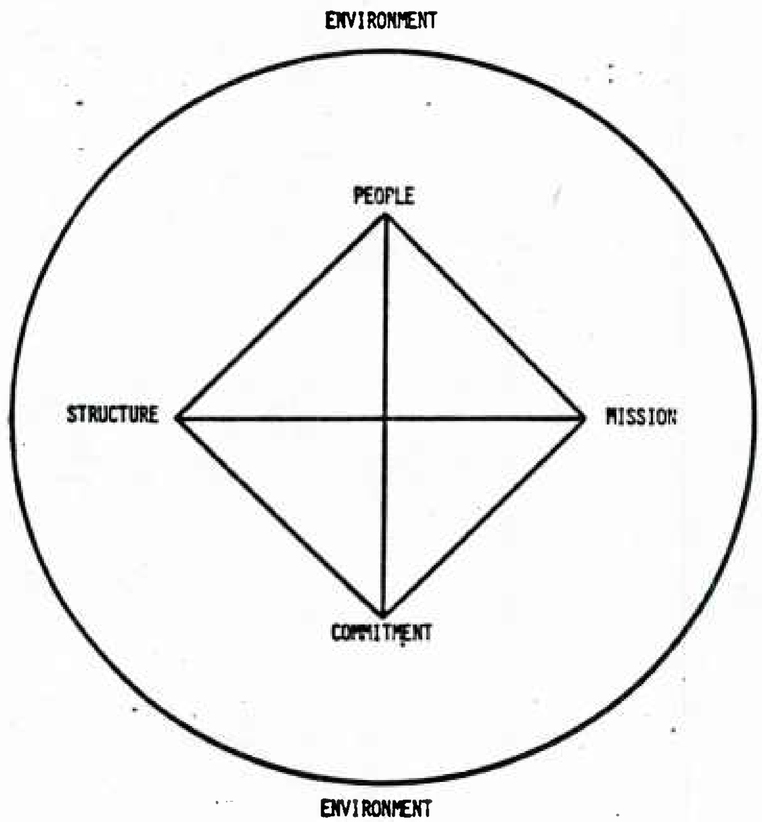


Figure F.3-1 Conceptual Model Factors

models, the components of the model are interrelated in such a manner that each factor is dependent upon and affected by the other factors. Therefore, a change in mission, for example, would necessitate a parallel change in structure or environmental considerations.

An interview guide (Figure F.3-2) based on the five initial interviews and the conceptual model was subsequently developed to elicit comments, ideas, and recommendations from other panel chairmen and members regarding the operations of their panels. The panels and chairmen were selected from a list of 50 panels described in the May 1983 JLC Organization and Panels Brochure. When the panel chairman was not available, alternate chairmen or panel members were interviewed.

## PEOPLE

Leadership styles. Some panel chairmen exhibit varying leadership and management styles, from autocratic to democratic and from aggressive to laissez-faire. What style has been used in your panel and has it been effective?

Turnover. What effect has turnover, if any, had on your panel?

Effect on experience, backgrounds necessary?

## MISSION

What is the mission of your panel? Are there specific goals and milestones -- to what extent are they specific? Does this help?

## COMMITMENT

Who are your supervisors and commanders? To what extent do they get involved in your panel's actions?

What are the incentives and disincentives for working on a panel?

## EXTERNAL PRESSURES

What are the pressures, if any, that you experience from external agencies?

Have these agencies influenced your panel's efforts and to what extent?

## STRUCTURE

Some organizations place panels at a high level within the bureacracy while others let panels work independently. Which fits your panel and what advantages do you accrue as a result?

Do you have sub-panels -- how many -- and are they helpful to your efforts?

Has your panel generated any joint programs?

Figure F.3-2 Interview Guide

Each of the thirty interviewees was initially asked to think about how the JLC could create future panels that would have a high probability of success. Their responses were then recorded under the appropriate factor on the interview guide. The questions were designed to be open-ended to permit elaboration on the issues as well as introduction of new concepts. The responses, therefore, did not lend themselves to meaningful statistical evaluation and were evaluated subjectively.

Approximately two-thirds of the interviews were conducted in person. The remainder were conducted by telephone because of their location. All interviews were conducted by an objective interviewer, an experienced Army organizational effectiveness consultant with no previous experience with JLC activities. To elicit candid responses, all interviewees were assured that the information would be processed anonymously.

### F.3.2 Success Characteristics

Characteristics that contributed to the success of a panel were developed for each of the five factors in the conceptual model (Figure F.2-1). These characteristics are discussed below.

For the people factor, the characteristics deemed essential to consider for creating a successful panel were the experience and background of panel members, the turnover rate of members, and the leadership style of the panel chairman.

For the mission factor a clear purpose and realistic, measurable objectives and milestones were thought to be conducive to panel success. Vague, non-specific missions often contribute to frustration and wasted time as members attempt to second guess higher-level desires and requirements.

For the commitment factor of the model the interest, involvement, and commitment of intermediate and higher levels of management affect panel success. Support throughout the chain of command is essential to success, especially in light of the fact that panel membership is an additional duty.

For the structure factor, characteristics critical to success are the level of the panel members in the organization, access to critical players like the OPR, and incentives or disincentives inherent in the JLC structure that motivate or fail to motivate panel members to create successful and effective panels. As with the commitment factor, the subgroup hypothesized that management support of panel efforts would contribute to successful accomplishment of the panel's mission.

For the environmental factor, the sub-group considered the degree of interest and pressure from external agencies, including the JLC, OSD, Congress, OMB, etc. It was theorized that high-level interest and pressure from outside agencies would tend to motivate a panel to achieve success.

### F.3.3 Interview Results

Members from 23 of the 50 JLC panels (46 percent) were interviewed. Figure F.3-3 lists these panels. The most frequently mentioned success characteristics are listed in Figure F.3-4. Discussion of each factor area follows this figure.

| |
|---|
| Munition Effectiveness |
| Joint Directors of Laboratories |
| Logistics Realism in JCS Exercises |
| Computer Resources Management |
| Special Test and Plant Equipment |
| Mercury - Cadmium - Telluride |
| Composites |
| Precision Optics Production Base |
| Micro Electronic/Electronic Components |
| Thermal Imaging Systems |
| Simulators and Training Devices |
| Automatic Testing |
| Release of Technical Data |
| Civilian Personnel Management |
| Wholesale Interservice Depot Support |
| Depot Maintenance Interservicing |
| Metrology and Calibration |
| Corrosion Prevention and Control |
| Nondestructive Inspection |
| Munitions Development |
| Aerial Targets/Target Technology |
| Digital Data |
| Logistics R&D |

Figure F.3-3 Panels and Groups Interviewed

I PEOPLE

Experience and background
Interest and willingness to serve
Leadership styles

II MISSION

Well-defined
Specific objectives and milestones
Critical issue with tri-service interest and application

III COMMITMENT

High level of command interest -- flag officer "champion"
Involvement of intermediate supervisors and commanders
Support from and access to hierarchy

IV STRUCTURE

Level of panel within the organization
Incentives and disincentives
Formalization -- job description, GPAS, OER Support Form, etc.

V ENVIRONMENT

Degree of JLC interest
Visibility
Influence of external agencies

Figure F.3-4 Characteristics of Success

People - In virtually every panel, there was tremendous concern to assign members with the requisite expertise and willingness to serve on the panel. Dedication and expertise

were considered absolutely essential. These factors are somewhat difficult to gage ahead of time, but it is worth the extra effort to ensure that the right people are being included. Comments on leadership style varied considerably from panel to panel, and no one style emerged as more effective than another. However, it was observed that panels did tend to take on the personalities of the chairman. Those that had dynamic, results-oriented chairmen produced results; those that had static and passive chairmen became static and passive.

<u>Mission</u> - Missions in JLC charters tend to be broad and general in nature. Most panels make these missions more specific by developing set objectives and milestones. The greatest concern among panel chairmen is to ensure that the identified JLC issue is critical enough to warrant the time and effort of a panel. In addition, if the issue does not have multi-service application and interest, commitment and consensus are much more difficult to achieve. Due to limited resources, it is imperative that the relevance of proposed JLC panels be considered so that important issues are addressed and unimportant issues are killed.

<u>Commitment</u> - Success characteristics associated with this factor were considered to be the most critical. Virtually all respondents indicated that panel success is directly related to the degree of command interest in the panel's efforts. Successful panels attribute much of their success to direct access to, and support of, a flag or general officer or SES-level civilian. The existence of a "champion" for the cause motivates and provides visibility for both individual panel members and for the program. Equally important is the involvement, or at least understanding, of the chain of command so that they comprehend the mission and the accompanying

expenditure of resources and time that will undoubtedly detract from everyday responsibilities. Some managers are supportive of panel members as evidenced by a willingness to provide administrative support, travel funds, and additional time to perform standard JLC duties and responsibilities. Some supervisors in the chain of command are less supportive, indicating that their overriding concern is their primary mission.

Structure - Respondents stated that the higher the panel's principal members are in the hierarchy, the more likely that the panel will achieve success. A current problem is that there is little formalization of JLC duties within the appraisal system. If the JLC panel issues are truly important, there should be some incorporation of these duties into job descriptions, OER forms, and CPAS/Merit Pay. This could elevate the perception of these duties to more than just "other duties as assigned." Incentives most frequently mentioned were individual and program visibility, ability to accomplish missions a single Service would not otherwise be able to accomplish, exposure and transfer of knowledge and techniques among Services, cost savings, and opportunity to contribute to a greater team effort with the potential to accomplish significant, high-level missions. Disincentives most frequently voiced by respondents included funding constraints, administrative burdens, lack of management support and understanding, and the fact that panel representation is an additional duty that often goes unrecognized.

Environment - Environmental influences had some impact on some panel members. Generally, the higher the visibility of the panel, the more supportive top management is and the more motivated the panel members are. Sixteen star interest at the quarterly JLC meetings inspires the entire

panel chain of command. Lack of visibility and support from top management leads to the opposite effect, creating a passive attitude among panel members. While pressures from external agencies like OSD and Congress may influence formation of a panel, these pressures have very little impact upon panel accomplishments. This is because panel members are usually far removed from the pressures and the lack of rewards for participation in JLC activities provides little incentive regardless of the degree of high-level interest.

Joint Programs - Each group was also asked if its panel had generated any joint programs. Some panels had recommended or developed joint regulations, but for the most part could not identify any specific joint programs that had been developed as a result of their efforts. This question was the least understood by the interviewees, but follow-up analysis indicates that the respondents interpreted "joint program" as one for which a formal requirements document was prepared. Since JLC groups do not prepare requirements documents, their answers are not surprising. The larger issue of "technology pull" versus "requirements push" is beyond the scope of the subgroup's efforts.

## F.4 CONCLUSIONS AND RECOMMENDATIONS

### F.4.1 Systematic Approach Conclusions

Summarizing the findings of Section F.2, the sub-panel concurs with the DSB finding that no systematic approach currently exists to identify opportunities for or to encourage implementation of joint service endeavors. The sub-panel's review of existing JLC activities indicates that a more systematic approach to examining opportunities for jointness is

possible. Of the various alternatives that were examined, chartering subordinate commander groups for each of the MIL-STD-881 commodity groups appears to have the greatest payoff with the least commitment of resources. Furthermore, chartering the subordinate commanders provides a mechanism to cover all of the points of view of JLC activities (Figure F.4-1) and creates panels for both a subordinate commanders group and for a technology/functional area group. Thus, a panel on aircraft propulsion could identify joint opportunities for the Joint Aeronautical Commanders Group while simultaneously serving as a sub-panel of a Joint Technical Coordinating Group on Propulsion. This ensures that ideas and opportunities for jointness are exchanged across commodity areas.

POINTS OF VIEW

| EXISTING GROUPS WITH ADDITION OF SUBORDINATE COMMANDERS GROUPS | COMMODITY | TECHNOLOGY | MISSION AREA | FUNCTIONAL AREA | CHRONOLOGY | PHASE OF DEVELOPMENT | INDUSTRY/MFR | ECLECTIC |
|---|---|---|---|---|---|---|---|---|
| JLC PANELS/GROUPS | X | X | | | | | X | |
| JLC SUBORDINATES | X | X | X | X | X | X | X | X |
| JLC ACTION TEAM | | | | | | | | X |
| JRMB | | | | | | X | | |
| OSD GROUPS | X | X | | | | | | |
| INDUSTRY ASSOCIATIONS | X | | X | | | | X | |

Figure F.4-1 Existing and Proposed Mechanisms for Identifying Joint Opportunities

Formation of JLC subordinate commanders' groups not only establishes a systematic mechanism for identifying joint opportunities, but also applies the success criteria developed during the interviews of panel and group members. Since the most critical factor for panel success is the level of command interest, involvment of the JLC subordinate commanders will provide additional incentives and visibility for all JLC panels and groups. This approach also boosts the activities of the Action Team by providing the subordinate commanders an opportunity to charter action teams for each commodity area. Simultaneous expansion of the JLC Action Team should also be considered to increase their ability to work on procedural or other issues that cut across commodity areas.

### F.4.2 Panel and Group Operations Conclusions

Creating successful future JLC panels is possible, particularly if there is support from all levels of management. Key success criteria are synopsized below.

- High-level "champion" - A senior official, preferably a flag officer, who is committed, involved, and supportive of the panel's efforts. This support would add visibility to the program, indicating to all levels of management the importance of the panel's mission.

- Formalization - Incorporation of panel responsibilities into job descriptions and appraisal systems. This would reinforce that JLC panels are critical and that the JLC expect at least 20 percent of time spent on panels.*

*Refer to JLC Operating Procedures, Paragraph IV.4.c.(3).

- High-level support - Periodic reinforcements by each commander to subordinate organizations emphasizing interest in joint activities. These should include the Commander's total support of the program, reinforcement of the fact that joint activities are an integral part of JLC activities, and explanation of type of support expected.

- Selection of panel members - Individuals selected for panel representation should have the requisite expertise and a willingness to contribute time and effort. When people are assigned with little regard to interests or background, immediate action should be taken to replace these people. High quality panel members will result in a high quality chairperson, as chairpersons are drawn from the pool of principal members.

- Level of panel and panel members - Panels high in the organization have fewer layers of management and greater program visibility. Panels with senior-level membership (GS-15, 0-6, or higher) have little difficulty gaining access to and support of the respective OPR. If it is not possible to place the panel high in the organization, consideration should be given to allowing the panel chairman direct access to top management.

- Reward system - Presentation of awards should be timely and presented at the highest level practical. Timely recognition of a job well done for an individual who must also perform a primary mission will enhance the stature and credibility of the JLC system and rectify the lack of tangible incentives.

### F.4.3 Recommendations

The study group recommends that the Joint Logistics Commanders sign charters for six groups of subordinate commanders. Figure F.4-2 shows a sample charter.

CHARTER
FOR
JOINT LOGISTICS COMMANDERS
JOINT AERONAUTICAL COMMANDERS GROUP

I. PURPOSE.

A Joint Aeronautical Commanders Group (JACG) is hereby established. The services share the same industrial base and technologies as well as the same potential adversaries. Opportunities, therefore, exist to coordinate or consolidate programs in research, development, acquisition, and support of military aeronautical systems. The purpose of the JACG is to identify these opportunities and to implement plans to reduce the cost and increase the effectiveness and interoperability of aeronautical systems managed by the US Army Materiel Development and Readiness Command, the Naval Material Command, the Air Force Logistics Command, and the Air Force Systems Command.

II. MISSION.

The mission of the JACG is to maintain oversight of all activities within the four logistics commands that involve research, development, acquisition, or support of aeronautical systems, subsystems, and components. Based on this knowledge of planned nd on-going activities, the JACG will identify programs and projects for joint sponsorship or management. In those instances where joint sponsorship or management is not warranted, the JACG will ensure coordination and exchange of information among the services to minimize or eliminate duplication of effort. In addition, the JACG will facilitate the exchange of information and expertise such as technical reports, contractor past performance data, source selection advisors, and design review consultants among agencies of the logistics commands.

III. GUIDANCE.

A. Final Report of the JLC Joint Service Acquisition Program Management Ad Hoc Group, June 1984.

B. Report of Defense Science Board 1983 Summer Study on Joint Service Acquisition Programs, February 1984.

C. GAO Report, Joint Major System Acquisition by the Military Services: An Elusive Strategy (GPO/NSIAD-84-22), January 1984.

D. JLC Guide for the Management of Joint Service Programs, current edition.

E. JLC Operating Procedures, current edition.

Figure F.4-3 Sample Charter

IV. REQUIREMENTS.

A. Membership. The following commanders are designated members of the JACG:

DARCOM: Commander, US Army Aviation Systems Command
NMC : Commander, Naval Air Systems Command
AFLC : Vice Commander, Air Force Logistics Command
AFSC : Commander, Aeronautical Systems Division

B. Lead Command Responsibility. AFLC is designated the lead command for the JACG. The Vice Commander, Air Force Logistics Command, shall chair the JACG.

C. Meetings. The designated commanders shall meet periodically to carry out the mission of the JACG.

D. Reports. The JACG shall report to the JLC at least annually on progress made toward achieving the mission of the JACG.

V. ADMINISTRATION.

A. The JACG may charter groups and panels to execute its mission. Such groups and panels should follow the guidance of the current edition of JLC Operating Procedures. A copy of charters, study plans, and reports, will be provided to the JLC Joint Secretariat for information.

B. The JLC Joint Secretariat will serve as the administrative interface between the JLC and the JACG.

C. Adequate resources including travel funds will be allocated to JACG activities to permit timely and efficient operations.

DONALD R. KEITH
General, USA
Commander
US Army Materiel Development

S. A. WHITE
Admiral, USN
Chief of Naval Material
Naval Material Command

JAMES P. MULLINS
General, USAF
Commander
Air Force Logistics Command

ROBERT T. MARSH
General, USAF
Commander
Air Force Systems Command

DATE: ______________

Figure F.4-3 Sample Charter (Continued)

The six groups that should be chartered are described below.

- The Joint Aeronautical Commanders Group composed of

  DARCOM: Commander, US Army Aviation Systems Command

  NMC: Commander, Naval Air Systems Command

  AFLC: Vice-Commander, Air Force Logistics Command

  AFSC: Commander, Aeronautical Systems Division

- The Joint Electronics Commanders Group composed of

  DARCOM: Commander, US Army Electronics Research and Development Command

  NMC: Commander, Naval Electronic Systems Command

  AFLC: Commander, San Antonio Air Logistics Center

  AFSC: Commander, Electronic Systems Division

- The Joint Ordnance Commanders Group composed of

  DARCOM: Commander, US Army Armament, Munitions, and Chemical Command

  NMC: Commander, Naval Sea Systems Command

  AFLC: Commander, Ogden Air Logistics Center

  AFSC: Commander, Armament Division

- The Joint Space Commanders Group composed of

  DARCOM: Commander, US Army Missile Command

  NMC: Director, Navy Space Project (PME 106)

  AFLC: Commander, Sacramento Air Logistics Center

  AFSC: Commander, Space Division

- The Joint Ballistic Missiles Commanders Group composed of

  DARCOM: Commander, US Army Missile Command

  NMC: Director, Strategic System Projects (PM1)

  AFLC: Commander, San Antonio Air Logistics Center

  AFSC: Commander, Ballistic Missile Office

- The Joint Vehicles Commanders Group composed of

  DARCOM: Commander, US Army Tank-Automotive Command

  NMC: Commander, Naval Facilities Engineering Command

  AFLC: Commander, Warner-Robbins Air Logistics Center

  AFSC: Director of Transportation, HQ AFSC.

A second recommendation worthy of mention is for the JLC Joint Secretariat to review all current and future JLC panels and groups generic to two or more commodity areas to ensure that the principles of successful panel operations are

applied. Revised charters, membership changes, or other revitalization methods should be applied where necessary. Panels and groups formed by the subordinate commanders should also adhere to these principles.

Third, the personnel chiefs of the four JLC commands should develop ways to recognize the efforts of military and civilian personnel who contribute effectively to JLC efforts.

Fourth, the JLC should explore with USDR&E the possibility of transferring the responsibilities of OSD coordinating groups made up of JLC personnel (such as the Joint Service Requirements Committee for avionics) to the JLC to reduce duplication of effort and bring such efforts back within the chain of command.

### F.4.4 Summary

The philosophy and operations of the Joint Logistics Commanders are founded on the principle of participative management. As such, they are in a key position to achieve reductions in cost and increases in readiness and effectiveness that can contribute to achieving an affordable national security. Adoption of the recommendations listed in section F.4.3 will enhance the effectiveness of JLC operations and increase the potential to realize future joint opportunities.

# APPENDIX G

## SERVICE OPERATIONAL REQUIREMENTS PROCESS

## SERVICE OPERATIONAL REQUIREMENTS PROCESS

### G.1 BACKGROUND

One of the more important areas of investigation in the Joint Program Study was the selection of joint programs. It was necessary to understand how selection occurs, including what procedures serve as input to the decisions and where these decisions are made. The primary impetus for materiel acquisition programs in the Services is each respective Service's requirements. It seems logical, therefore, that those same requirements processes would provide candidates for joint acquisition programs. In order to understand these processes and their relationship to joint acquisition programs, the study group supplemented its primary effort with an ancillary analysis of the Services' requirements processes. The purpose of this effort was two fold:

- The first was to determine the effectiveness of the Services' requirements processes for identifying joint programs
- The second was to look for ways to increase Service participation in identifying candidate joint programs.

The thrust of this analysis was not to question the effectiveness of each Service's process, but rather to find out whether these processes complemented each other and could serve as a source of joint programs.

## G.2 STUDY APPROACH

An analysis of the primary study data base showed that few, if any, joint programs are generated by the Service requirements process. The approach used was to review each Service's process, compare them to each other, and determine whether procedures existed to mesh two or more Services' needs into a prospective joint program. Section G.3 presents a brief synopsis of each Service's requirements process and the procedures for harmonization of these processes. Section G.4 presents conclusions drawn by the study group.

## G.3 SERVICE REQUIREMENTS PROCESSES

### G.3.1 United States Air Force

Details of the Air Force requirements process for mission critical and support systems are detailed in Air Force Regulation 57-1 which is supported by the Air Force 800 Series Regulations for Acquisition and implementation procedures provided by Air Force Systems Command pamphlet 800-3.

The Directorate of Operational Requirements, AF/RDQM is the office of primary responsibility for managing the Statement of Need (SON) document that presents the USER need to the Air Force.

Simply stated, the process consists of the user generating the SON, coordinating that need with the other Major Air Commands, and forwarding it to the Air Staff for validation. The validation process does provide for formal coordination with other Services.

When the SONs are received by the Air Staff, AF/RDQM forwards copies of the SON to the other Services for their review. This "harmonization" or inter-Service information review activity occurs very early in the Air Force validation process (see Figure G.2-1). A major weakness of the Air Force harmonization process, which is also true for the other Services, is the lack of a manditory feed-back loop to ensure that appropriate action is taken by the other Services.

SERVICE REQUIREMENTS PROCESSES

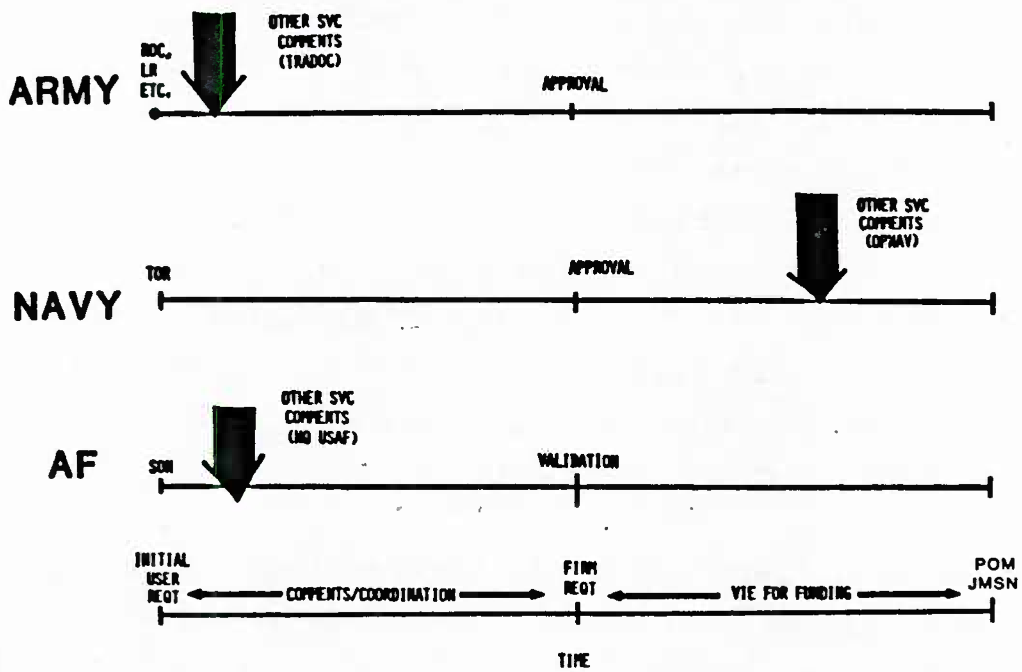


Figure G.2-1 Service Requirements Processes

G.3.2 <u>United States Army</u>

The Army's requirements process is outlined in AR71-9, Materiel Objectives and Requirements, with implementing instructions in DARCOM/TRADOC Pamphlet 70-2, Materiel

Acquisition Handbook. Responsibility for requirements on the Army Staff falls in the Force Development Directorate of the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS). Although the ODCSOPS is the DA staff element responsible for requirements, and in fact validates most requirements in the Army process, the Army's Training and Doctrine Command (TRADOC) plays a very key role.

As the Army Combat Developer and user representative, TRADOC is responsible for the generation and staffing of Army requirements. While requirements usually originate in one of the TRADOC schools, formal "world wide" staffing is the purview of the TRADOC headquarters. In fact, the "harmonization process," or the process whereby the requirements is staffed by the other Services, occurs at the same time as the staffing by major Army commands and is the responsibiltiy of TRADOC, not the Army staff. (See Figure G.2-1.) Unfortunately, this process suffers from the same lack of a formal requirement for feedback as does the Air Force process.

Two major differences exist between the Army and Air Force processes: (1) validation of a requirement may occur at TRADOC or the Army Staff, depending on the size of the program as opposed to being strictly handled at the Air Force Staff, and (2) the Army requirements can be documented in several formats as compared to a single one for the Air Force.

### G.3.3 United States Navy

Since the current requirements process adopted by the Navy is fairly new, it is promulgated as an operational Naval Instruction (OPNAVINST) 5000.42B, dated 20 August 1983. The Navy's process is managed by OPNAV-098/3U300690, which functions as the office of primary responsibility within the Chief

of Naval Operations. Not only is the Navy's process new, but it differs markedly from the process of the other Services. The primary differences are discussed below.

Program initiation in the Navy's requirements process begins with a "Tentative Operational Requirement" (TOR). Submission of the TOR, if approved, leads to the "Development Options Paper" (DOP) and the consequent establishment of the "Operational Requirement" (OR). On the surface it seems much like the other Services' procedures, but the Navy has added a very important step that does not exist in the other Services.

The transition from a TOR to an OR in the Navy is analogous to "requirement validation" in the other two Services, with one critical difference. In the Navy process, a requirement is not validated if it is not going to be funded. Accordingly, the Navy does not send their requirements out for other Service staffing until after the "validation" decision is made. (See Figure G.2-1.) This difference creates two significant problems: (1) Navy requirements are "harmonized" very late in the process and (2) Navy requirements that are not intended to be funded are not "harmonized" at all.

The Navy process also lacks a formal requirement for feedback to close the loop on other Service review of the requirement.

## G.4 CONCLUSIONS

The Services' reouirements processes are much more intricate than indicated by the limited descriptions presented in this study. On an individual level, each set of procedures appears sufficient to meet the needs of its own Service. The

problem in the joint acquisition arena is that each Service has its own process and there are no formal procedures for bringing together the needs of more than one Service.

The inter-Service review process, though faithfully followed by the Services as far as sending the requirements to each other, has not recently produced any candidate joint programs. A search was conducted of the Air Force records for FY82 and FY83 to determine if any joint programs had been initiated. Figure G.4-1 shows the number of documents from each Service for each year that were received by the Air Force for review. No joint programs were initiated as a result of those reviews. Neither the Air Force nor the Army Staff had any records of how many of these documents had been commented on by the Air Force. A similar review could not be conducted in the other Services because the information was not available.

| | ARMY | NAVY | MARINES |
|---|---|---|---|
| FY83 | 50 | 0 | 23 |
| FY82 | 29 | 0 | 9 |

Figure G.4-1 Requirements Documents Forwarded to Headquarters USAF

## G.5 RECOMMENDATIONS

If the Services are to become more active in the initiation of joint programs, they must adapt their requirements processes to that end. The recently formed Joint Requirements

Management Board is an excellent vehicle for providing inter-Service consideration of materiel requirements and is strongly supported by the JPS group. If the JRMB and the Services are to be fully effective in establishing joint programs, the Services must:

- Formalize the process whereby their requirements documents are shared with the other Services and initiate a required feedback loop, forcing detailed review of and substantive comment on these documents

- Institutionalize a process to ensure support of JRMB initiatives at all levels, in particular, the exchange of technical information between the JLC and JRMB working groups

- Provide for JRMB review of all major new starts for jointness. (Details of this recommendation are included in the body of the report.)

# APPENDIX H
# COST/BENEFIT ANALYSIS

## COST/BENEFIT ANALYSIS

### H.1 INTRODUCTION

A primary rationale for establishing joint programs is avoiding the duplication of effort and expense that occurs when two or more Services pursue similar program objectives independently. In many cases little analysis is accomplished to determine the magnitude of the potential savings that might result from jointness. The absence of this analysis is particularly critical because the history of joint programs has indicated that comparatively high cost and schedule growth rates in joint programs may quickly erode or eliminate these projected cost savings. It is, therefore, necessary to determine that a significiant savings potential exists before initiating a joint program if the primary rationale for jointness is cost savings.

The purpose of this appendix is to discuss in general terms how a cost analysis of this type might be conducted. There are many difficulties and uncertainties which must be dealt with in comparing hypothetical alternative costs for parallel single service programs and for joint programs. The presence of such difficulties has probably discouraged the initiation of such comparative analyses in the past. However, useful and important insights can be gleaned from such analyses even when estimating techniques are somewhat imprecise. The lack of any analysis might lead to an improper decision to establish a joint program when the actual potential for cost savings is minimal.

## H.2 COMPARATIVE DEVELOPMENT COSTS

Development cost savings in joint programs result primarily from not duplicating development efforts. The cost of developing a single system to meet the needs of two Services should be less than the cost of developing two separate but comparable systems. Development costs for a joint program, however, might be somewhat higher than the development costs for one single Service program of similar scope. There are likely to be incremental costs associated with the requirement to meet certain Service-unique needs and requirements of one or more participating Services. Thus, total joint development costs are likely to be somewhat higher than those for a comparable single Service program, but substantially less than the total costs that might be expected from two independent single Service efforts. This is illustrated in Figure H.2-1.

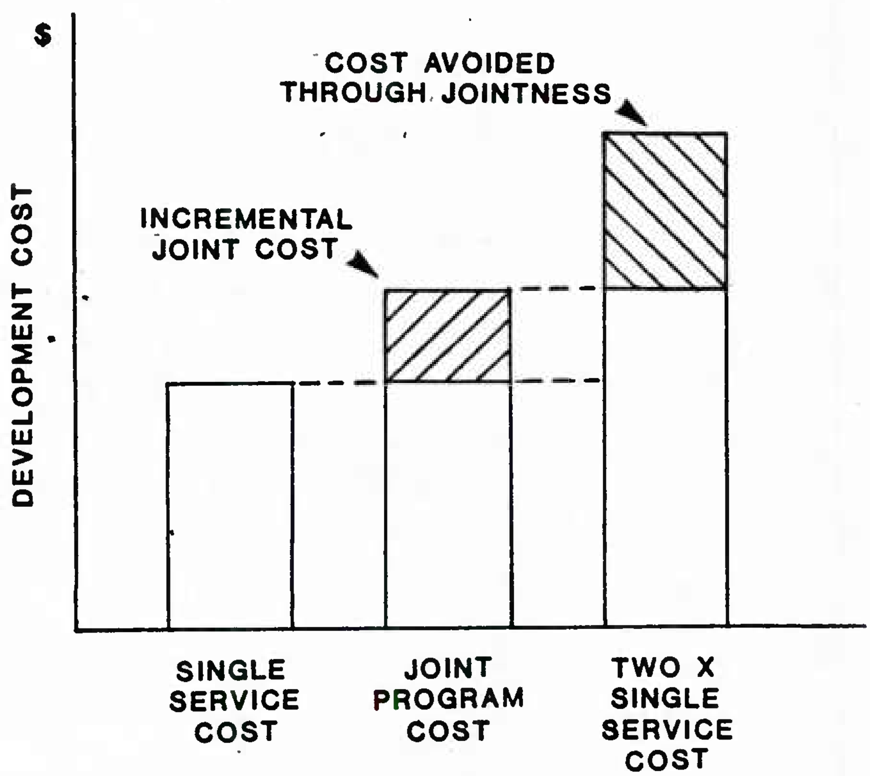


Figure H.2-1 Comparative Development Costs

The estimation of comparative development costs for single Service and joint programs can be accomplished using any of several alternative cost estimation techniques. Cost estimating methodologies fall into three general categories:

- Estimation by analogy
- Estimation by parametrics
- Estimation by detailed engineering analysis

Estimation by analogy is accomplished by employing the actual cost history of one or more recent similar systems to provide a precedent for estimating the developmetnt cost of a new system. Parametric techniques employ statisitically derived cost estimating relaitonships to estimate development costs based on several critical attributes of a system, such as weight, volume, complexity, speed, thrust, etc. Detailed engineering estimates are derived by building a bottom-up cost estimate for each major component of a system using engineering standards for estimating costs of development. This last technique is usually not appropriate in the earliest phases of a program, because it requires fairly detailed design specifications that are often not available at this point. Generally, analogous and parametric estimating techniques are employed in the early phases of a program before detailed design specifications have been developed.

Regardless of the cost estimation method employed, the critical task in estimating the comparative costs of joint and parallel single Service developments is identifying the basic common system development costs and then the incremental costs which are required to meet Service-specific needs. An

example of this kind of anlaysis was performed for the Air Force Nighthawk (HH-60D) program using data supplied by the Air Force, Army, and Navy.

The Nighthawk is a search-and-rescue and special mission helicopter based on the basic Army Blackhawk (UH-60A) helicopter airframe. The engine for the Nighthawk, as well as major elements of the power train, will be derived from the Navy Seahawk (SH-60B) program. The decision to base the Nighthawk program on the airframe and engines developed by the Army and Navy was motivated in large part by the desire to avoid the additional development costs that would have been required to produce an all-new aircraft with comparable capabilities. In this case, computation of the avoided development costs is fairly easy using an analogy estimation technique. The development cost history for the Blackhawk and Seahawk is established. An estimate of the development cost for an all-new Nighthawk can be reasonably projected using the cost precedents established in the Blackhawk and Seahawk programs. Estimates of the avoided development costs for airframe, engines, and power train in the Nighthawk program are presented in Table H.2-1.

TABLE H.2-1

Nighthawk Development Cost Savings
(Then Year Dollars)

| SUBSYSTEM | EST. AVOIDED COST | EST. SVC.-UNIQUE COST |
|---|---|---|
| Airframe | 450M | 170M |
| Engine and Power Train | 135M | -- |

The estimated Service-unique costs presented in Table H.2-1 are development costs associated with changes to the basic Blackhawk airframe that must be made by the Air Force to meet specific mission performance requirements. The estimation of these development costs was accomplished using parametric techniques based on the engineering man-hours per pound experienced in the Blackhawk design and development program. These costs are a fraction of the total estimated avoided development costs. Thus, the joint use of the basic Blackhawk and Seahawk airframe and power train elements resulted in a significant reduction in total estimated Nighthawk development costs.

## H.3 COMPARATIVE PRODUCTION COSTS

Production cost savings for joint programs arise from the avoidance of non-recurring production set-up costs and from the reductions in recurring costs that result from learning curve effects and more efficient production rates. The estimation of non-recurring cost savings can be accomplished by analysis of the tooling and production lines with different rate capabilities. A line with sufficient capacity to handle the joint requirements of two or more Services will generally require less non-recurring investment than two or more separate lines with lower capacity.

Recurring production cost savings are realized by taking advantage of the reduction in unit costs that occurs as the cumulative number of items produced on a given line increases, the so-called learning effects. The potential savings that can result from a combined buy are illustrated in Figure H.3-1. Figure H.3-1 presents a typical learning curve which shows the exponential production quantity increases. The area under this curve from the origin to any point on the

horizontal axis represents the total production cost for that quantity.

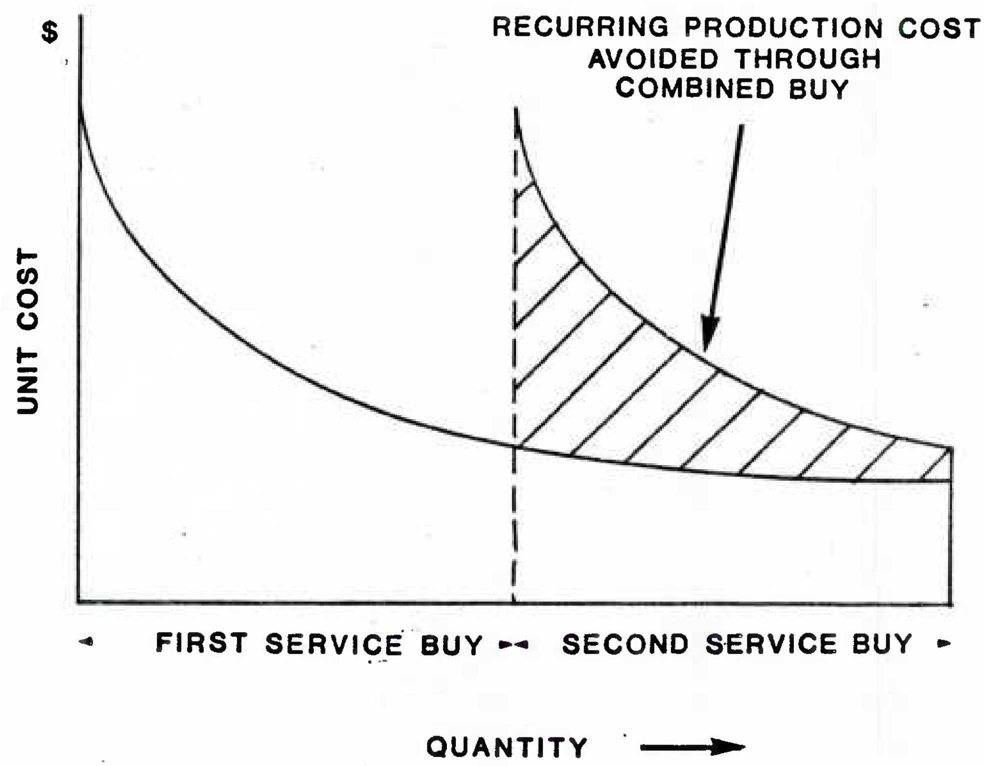


Figure H.3-1 Production Cost Learning Curves

The production cost, which can be avoided by combining two equal production quantities on the same production line, is illustrated by the shaded area below the second learning curve. In essence, the second buy on an established line takes advantage of the learning achieved during the first buy. Unit costs are significantly below those which would be experienced by starting anew on a second line.

The estimation of comparative joint and parallel single Service recurring production cost requires that learning curve characteristics, including first unit cost and learning rate,

be generated for both single Service and joint production options. The costs of alternate production runs can then be estimated and compared. One potential difficulty which may be encountered in this analysis is estimation of the differences in first unit cost that might occur between single Service and joint programs. In some cases a joint program might have higher first unit costs because of the inclusion of performance characteristics that might not be included in a single Service design. Higher first unit costs may offset some of the joint savings that result from the learning curve effects; therefore, care must be taken to ensure that first unit costs fairly reflect potential design differences.

Estimated production cost savings for the Nighthawk production run were derived using a learning curve approach for those portions of the airframe and power train which will be purchased in common with the Army and Navy. The results of this analysis are presented in Table H.2. The estimated power train savings in this case are negligible because the Services anticipate a flat learning curve on the T700 engine which has a very long production history.

Table H.2 Nighthawk Production Cost Savings (Then Year Dollars)

| Subsystem | Estimated Savings |
|---|---|
| Airframe | 416M |
| Eng/Pwr Trn | --- |

## H.4 COMPARATIVE OPERATION AND SUPPORT COSTS

Joint programs present opportunities for reduction of both non-recurring and recurring operation and support (O&S) costs. Non-recurring costs include such items as acquisition of special test equipment, development of technical manuals, establishment of depot and intermediate maintenance facilities, and acquisition of initial spares. Recurring costs consist of such categories as replenishment spares, repair labor, and shipping costs. Estimation of the magnitude of potential savings in these various cost categories requires individual evaluation of each O&S cost category to determine whether potential savings exist.

Non-recurring cost avoidance can occur through such practices as multi-service utilization of common technical manuals, joint depot inter-servicing, and use of common test equipment and tooling. Each of these practices results in avoidance of cost duplication which can be directly estimated. Each element of non-recurring support cost can be estimated using the same general techniques that apply to development and production costs. These include estimation by analogy, by parametric cost estimating relationships, and by detailed engineering estimates.

Recurring operation and support cost savings can be realized through acquisition of common spares. Larger combined spares buys provides opportunities for cost reduction through learning curve effects, such as those which apply to common production runs, and through economies of scale which are realized when spares are acquired in larger lot quantities. These savings will vary depending on the particular replenishment spares requirements of individual programs, but they can be estimated using conventional spares cost estimation techniques.

The Blackhawk, Seahawk, and Nighthawk program offices are currently engaged in on-going analyses of means by which common logistics support actions can be employed to reduce operation and support costs for the three Services. Table H.4-1 provides a listing of specific savings which have been identified to date as a result of common support efforts.

TABLE H.4-1

BLACKHAWK, SEAHAWK, NIGHTHAWK SUPPORT COST SAVINGS THROUGH COMMONALITY

| Action | Est. Life Cycle Savings |
|---|---|
| Increased use of common spare parts | $4.8 million |
| Utilize common technical publications | $35.7 million |
| Utilize common quality assurance system | $26.7 million |

The listing in Table H.4-1 is not an exhaustive listing of the potential O&S cost savings which might be achieved in these programs through jointness. However, these calculations are representative of the types of computations that can and should be made to support analysis of the potential cost benefits of joint programs.

## H.5 CONCLUSION

The purpose of ths appendix has been to discuss the general techniques that might be employed to assess the comparative costs of joint and single Service programs. One example has been presented where such calculations have been made. These estimates are admittedly difficult and subject to

a high degree of uncertainty. However, they do provide useful insights into the magnitude of potential savings that might be realized through joint programs. These insights are necessary if future decisions to initiate joint programs are to be based on sound analysis rather than intuitive judgments about the potential for cost avoidance through jointness.

APPENDIX I

JOINT PROGRAM LOGISTICS STUDY

# JOINT PROGRAM LOGISTICS STUDY

The Joint Program Study Group undertook a special study effort to examine logistics planning and management in joint programs. The main purpose of this effort was to identify the nature of special problems encountered by logistics managers in joint programs, and to identify potential solutions for those problems. A second objective was to determine the extent of commonality that currently exists in joint programs in technical orders and manuals, support equipment, depot servicing arrangements, spares purchases, etc.

## I.1 METHODOLOGY

Data for this study was collected through personal interviews with the Deputy or Assistant Program Manager for Logistics. A standard questionnaire was used to structure the interview and to elicit information on the management of the logistics effort. Not all of the 80 joint programs in the data base were considered appropriate for inclusion in the logistics study. Technology programs such as Guayule Rubber and programs such as the Standard Simulator Data Base, which did not have a traditional logistics requirement, were excluded. Table I.1.1 lists the 68 programs included in the logistics study.

TABLE I.1.1

LIST OF 68 PROGRAMS INCLUDED IN
JOINT PROGRAM LOGISTICS STUDY

| # | PROGRAM NAME |
|---|---|
| 1 | AIM-7M - SPARROW |
| 2 | AIM-9M - SIDEWINDER |
| 3 | ALCM - AIR LAUNCHED CRUISE MISSILE |
| 4 | AMRAAM - ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE |
| 5 | AN/AVS-6 - AVIATORS NIGHT VISION IMAGING SYSTEM |
| 6 | AN/TSC 94A/100A - GROUND MOBILE FORCES SATELLITE TERMINAL |
| 7 | APG-63 - RADAR |
| 8 | ASPJ - AIRBORNE SELF-PROTECTION JAMMER |
| 9 | A-7D - AIRCRAFT |
| 10 | BIGEYE - GLU-80B-CHEMICAL BOMB |
| 11 | BISS - BASE & INSTALL SECURITY SYSTEM |
| 12 | CFFS - COMBAT FIELD FEEDING SYSTEM |
| 13 | CIP - AIRCRACT ENGINE COMPONENT IMPROVEMENT PROGRAM (Mgmt. Only) |
| 14 | CNCE - TRI-TAC-DIGITAL COMMUNICATION EQUIPMENT |
| 15 | COBRA-JUDY - PHASE ARRAY RADAR SYSTEM |
| 16 | COMBAT IDENTIFICATION |
| 17 | COPPERHEAD - 155mm CANNON LAUNCHED GUIDED PROJECTILE |
| 18 | DMSP - DEFENSE METEOROLOGICAL SATELLITE PROGRAM |
| 19 | DRAMA RADIO-DIGITAL RADIO AND MULTIPLEX ACQUISITION |
| 20 | DSCS GROUND STATION |
| 21 | EMDP - ENGINE MODEL DERIVATIVE PROGRAM |
| 22 | FIREBOLT - AERIAL TARGET |
| 23 | FLTSATCOM - FLEET SATELLITE COMMUNICATION |
| 24 | FMU-139 FUZE |
| 25 | F-111 AIRCRAFT |
| 26 | F-4B/F-4C AIRCRAFT |
| 27 | GATOR - MINE |
| 28 | GLCM - GROUND LAUNCHED CRUISE MISSILE |
| 29 | GPS - NAVSTAR GLOBAL POSITIONING SYSTEM |
| 30 | HARM - AGM-88A MISSILE |
| 31 | HELLFIRE MISSILE |
| 32 | HH-60D - COMBAT HELICOPTER MODERNIZATION |
| 33 | HMMWV - HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE |
| 34 | IR MAVERICK - INFRA-RED MAVERICK |
| 35 | JSTARS - JOINT SURVEILLANCE & TARGETING ATTACK RADAR SYSTEM |
| 36 | JTACMS - JOINT TACTICAL MISSILE SYSTEM |
| 37 | JTIDS - JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM |
| 38 | JVX - JOINT ADVANCED VERTICAL LIFT AIRCRAFT |
| 39 | LASER MAVERICK |
| 40 | LAV - LIGHT ARMORED VEHICLE |
| 41 | LLLGB - LOW LEVEL LASER GUIDED BOMB |
| 42 | MEP - MOBILE ELECTRIC POWER |

TABLE I.1.1 (Continued)

LIST OF 68 PROGRAMS INCLUDED IN
JOINT PROGRAM LOGISTICS STUDY

| # | PROGRAM NAME |
|---|---|
| 44 | MPGS - MOBILE PROTECTED GUN SYSTEM |
| 45 | MRASM - MEDIUM RANGE AIR-TO-SURFACE MISSILE |
| 46 | MSCS - MULTI SERVICE COMMUNICATION SYSTEM-AN/TTC-TYC-39 Tactical Switches (TRI-TAC) |
| 47 | MSER - MULTIPLE STORAGE EJECTOR RACK |
| 48 | M-198 HOWITZER |
| 49 | OBOGS - ON-BOARD OXYGEN GENERATING SYSTEM |
| 50 | PACER SPEAK - RADIO |
| 51 | PLRS - POSITION LOCATION REPORTING SYSTEM |
| 52 | ROWPU - REVERSE OSMOSIS WATER PURIFICATION UNIT |
| 53 | SAHRS - STANDARD ATTITUDE HEADING REFERENCE SYSTEM |
| 54 | SCADC - STANDARD CENTRAL AIR DATA COMPUTER |
| 55 | SCOTT - SINGEL CHANNEL OBJECTIVE TACTICAL TERMINAL |
| 56 | SLCM - SEA LAUNCHED CRUISE MISSILE |
| 57 | SAW - SQUAD AUTO WEAPON |
| 58 | STANDARD ARM - MISSILE |
| 59 | STINGER - MISSILE |
| 60 | TACTICAL SHELTERS |
| 61 | TAKR - FAST LOGISTICS SHIP |
| 62 | TEMPER TENT |
| 63 | TIPI - TACTICAL INFORMATION PROCESS AND INTERPRETATION |
| 64 | VOLCANO - RAPID MINE DISPENSING SYSTEM |
| 65 | WIS - WWMCCS IMPROVEMENT SYSTEM |
| 66 | 40MM AMMUNITION |
| 67 | 5 TON TRUCK |
| 68 | 9MM HAND GUN |

The joint logistics questionnaire addressed three major areas:

- The extent to which prescribed logistics techniques (SISMS, JLSPs, LSAs) were used
- The degree of common logistics achieved between the Services involved in the program
- The success in supporting the system at the scheduled First Unit Equipped (FUE) date.

The last area was not included in the analysis because only a very small percentage of the programs had fielded their system or had data on how well the system had been supported at FUE.

In addition to the structured questionnaire, interviewees were asked to provide insights into the three worst logistics management problems that arose because the program was joint, and the three things they think should have been managed differently. These two questions provided an important addition to the questionnaire in that they gave the interviewees an opportunity to express their opinion as to what was right or wrong with logistics management in joint programs. Interviews were also conducted at several logistics support centers using the same questionnaires to provide another perspective than that of program office logisticians.

An extremely consistent pattern of responses was received from both the program office and the support center logistics personnel. Regardless of the type of system or the lead Service, the responses to the logistics questionnaire and interview were similar across the sample. Section I.2 presents the findings and recommendations based on the interviews. Section I.3 presents a detailed discussion of logistics commonality in joint programs and Section I.4 presents the study group's conclusions.

## I.2 FINDINGS AND RECOMMENDATIONS

This section presents the study group's findings and recommendations based on the logistics managers' responses to the questionnaire and on their insights into problems in joint logistics programs and potential solutions for these problems.

The major finding of the Joint Program Logistics Study was that logisticians in joint programs make relatively little use of the tools designed for managing logistics. Only 34 percent of the managers questioned used the Standard Interservice Support Management System (SISMS), only 47 percent used the Joint Integrated Logistics Support Plan (JILSP), and only 68 percent used Logistics Support Analysis (LSA). Figure I.1-1 shows the use of logistics management tools in joint programs. Although this study collected no comparable data showing the use (or lack of use) of these tools by single Service program offices, it seems reasonable to expect that failure to make use of these tools would create more problems in joint programs because of the lack of a standard logistics support system. In fact, follow-up questions indicated that over half (51 percent) of the logisticians in joint programs had little or no understanding of other Services' logistics procedures and, therefore, experienced severe problems in trying to coordinate and communicate with the other Services.

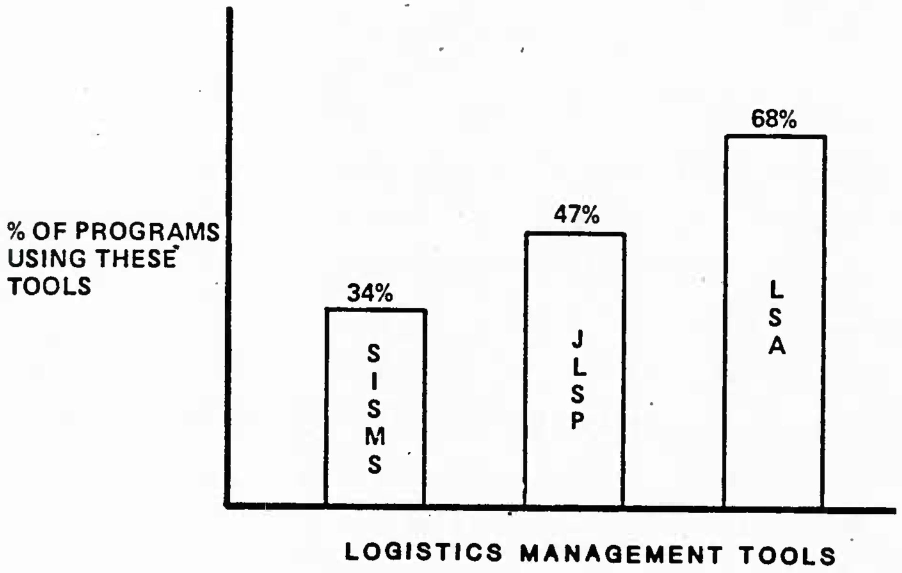


Figure I.1-1 Use of Logistics Management Tools in Joint Programs

Underutilization of these logistics management tools seems largely to be a result of inadequate training of the logistics managers. The study group recommends, therefore, three steps to increase the use of these tools and minimize inter-Service communication problems:

- Train logisticians in the policies and procedures relating to joint logistics <u>before</u> they are assigned to a joint program office. (The present level of knowledge is totally inadequate to enable effective management of the logistics function)
- Establish a follow-on training program to keep logisticians current and to broaden their knowledge base
- Establish an information source that provides logisticians information on each Service's logistics procedures. This would enable logisticians access to accurate information in areas too detailed to have been covered in general training.

The second major finding of the study group was that less than half (47 percent) of the programs had a common maintenance concept. A summary of the joint logistics managers' top three problems (Table I.1-1) indicates that 30 percent of the programs found this lack of a common concept a major problem. While most of the logistics managers felt that a common maintenance concept would be beneficial, many had difficulty obtaining one. (A more detailed discussion of joint logistics commonality is provided in Section I.3).

TABLE I.1.3

LOGISTICS MANAGERS PROBLEMS

| Problem | Percent of Programs with Problem* |
|---|---|
| Problems Communicating with Other Services | 43% |
| Problems Resolving Requirements | 33% |
| Lack of Common Support Concept | 30% |
| Lack of Common Procedures | 25% |

(Note: Based on a sample of 40 programs)

Table I.1-2 shows the solutions proposed by logistics managers for improving joint logistics management. Both this table and Table I.1-1 indicate that different Service procedures are a major source of problems in joint logistics, leading to problems communicating with the other Services and perhaps making resolution of requirements differences more difficult.

TABLE I.1-2

LOGISTICS MANAGERS SUGGESTIONS

| Suggestion | Percent of Programs Making Suggestion* |
|---|---|
| Colocate and Communicate | 40% |
| Resolve Requirements Earlier | 18% |
| Establish Common Procedures | 16% |
| Hire Better Trained Personnel | 11% |

(Note: Based on a sample of 46 programs)

*As choices were not mutually exclusive, percents indicated add to more than 100 percent.

## I.3 LOGISTICS COMMONALITY

The percent of joint programs with commonality in various logistics areas is shown in Figure I.3-1. A program was given credit for achieving commonality if any aspect of a given logistics area was common. For example, a program that bought the same training material, even if intended for separate Service training courses, was considered to have achieved training commonality. A program with only one common technical manual among many, was considered to have achieved common manuals. The percents displayed in Figure I.3-1, therefore, indicate the presence, but not the extent, of commonality. In general, in cases where commonality did exist, the extent of the commonality was great. For example, 70 percent of the programs with common technical manuals had at least 90 percent of their technical manuals in commmon. Sixty-eight percent of the programs with common peculiar support equipment had over 90 percent of this equipment in common.

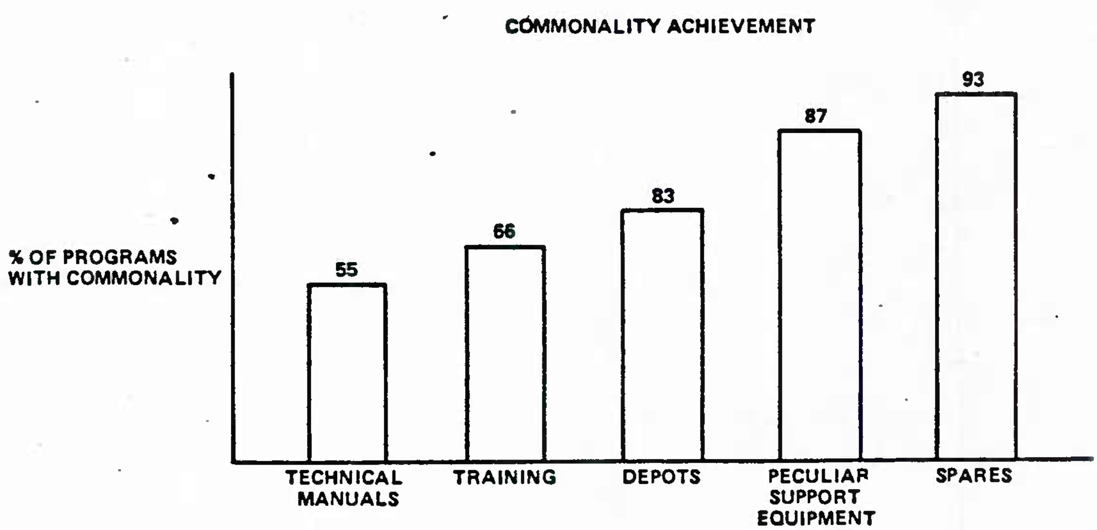


Figure I.3-1 Achievement of Logistics Commonality

### I.3.1 Technical Manual Commonality

Clearly, there is room for improvement in obtaining logistics commonality, particularly in the high cost area of technical manuals. The study group found that the primary reason for the lack of common technical manuals was that the Services had different manual formats. Fifty-four percent of the program offices indicated that format, and format alone, was the reason for not writing common manuals. The remaining programs indicated that content as well as format were responsible for the separate technical manuals. The study group felt that format differences were not a sufficient reason to justify different technical manuals. Content differences required by different maintenance concepts, however, could be a valid reason. The data, however, did not indicate that content differences were strongly associated with different maintenance concepts. Slightly more than half of the programs with common maintenance concepts had common manuals; slightly less than half of the programs with different maintenance concepts had common manuals. Different maintenance concepts, therefore, did not appear to be the driving factor behind different manuals for different Services.

In the process of trying to identify the causes of, and possible solutions to, the problem of low technical manual commonality, the study group investigated the Technical Manual Specifications and Standards (TMSS) group and a number of other groups working on the automation of technical information. The ongoing effort of the TMSS to develop a common paper specification for multiservice use will help to alleviate this problem of different manuals.* The potential of an

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*Technical Manual Specifications and Standards Plan, OUSDR&E, July 1983.

automated technical data system for enforcing technical data commonality, however, is greater than that of a common paper specification. The extent to which a paper specification can be amended or modified to produce two different versions of a manual is far greater than the extent to which a common automated system can be so modified.

A cursory investigation of the Services' progress toward automation of technical information (ATI) showed that each Service was active in this area, but that efforts were fragmented and there was no coordinating agency to oversee the work. Some inter-Service coordination was being undertaken by a sub-panel of the JLC Logistics R&D panel. Given, however, the potential a successful ATI system has for increasing manual commonality and reducing manual cost, there does not seem to be a strong enough joint effort on the part of the Services to develop an automated standard.

A joint program, jointly funded and with a single, authoritative manager responsible for developing and implementing an ATI architecture suitable for all the Services, could be technically and financially feasible. Such a program would provide the strong joint management required to implement ATI in a form usable by all the Services before the Services individually implement ATI in their own unique forms. In the past, DoD has been unsuccessful in directing the Services to establish interoperable automated provisioning systems because once a process becomes part of an automated system, it cannot be easily changed. The JLC should task the R&D panel to explore the feasibility of a joint program to develop a common ATI system before the Services develop individual and inflexible Service-unique ATI systems.

### I.3.2 Training Commonality

Commonality in training was somewhat higher (by 11 percent) than commonality in technical manuals. In cases where manuals are common, it would be reasonable to expect that training would also be common because the course of instruction would be based on the same manual. There are additional opportunities for common training, however, even when manuals are not common. Specifically, this common training can occur using contractor furnished training materials that are alike for all Services.

### I.3.3 Depot Commonality

The high proportion of programs that had common depots reflects the emphasis placed upon depot interservicing by the JLC and the discipline provided by the depot maintenance interservicing process. Programs that did not have common depots generally had a rationale, such as survivability, for the lack of a common depot or had established depots prior to the thrust for depot commonality. Those programs that did not have common depots, and did not have a rationale to preclude use of a common depot, generally had contractor operated or furnished depot facilities. Contracting for depot support appears to provide a loophole in the depot maintenance interservicing process. To circumvent this problem, the JLC should ensure that contracts for depot repair services pass through the depot maintenance interservicing process.

### I.3.4 Peculiar Support Equipment and Spares Commonality

The commonality measures of 87 and 93 percent, respectively for peculiar support equipment and spares are interesting

in that they imply that the differences in service maintenance concepts are not as significant as some of the logistics managers indicated. Although even one major piece of service unique peculiar or common support equipment (such as the Army's AN/USM-105 electronic test facility) can generate a different maintenance concept, the fact that most joint programs use at least some of the same peculiar support equipment and the same spares indicates that their maintenance concepts cannot be too different. This also supports the observation that format differences cause non-common technical manuals since procedures using the same support equipment and parts are the same. Those programs that had no spares commonality did not regard themselves as joint program and their responses were a reflection of this attitude.

## I.4 CONCLUSION

Joint programs are clearly subject to some unique logistics problems. For the most part, however, these problems are the result of the different ways the Services have for formatting manuals, provisioning, etc. and not the result of truly unique joint logistics requirements. Educating logisticians as to the other Service's procedures and developing standard manual formats and ATI systems would enhance communications between the Services and facilitate increased commonality in all areas of logistics. Perhaps more than any other area in joint program management, there is potential in logistics to minimize inter-Service differences, achieve greater commonality, and reap the cost benefits and interoperability opportunities that are the primary rationales for creating joint programs.

# APPENDIX J
# JOINT PROGRAM TEST STUDY

# JOINT PROGRAM TEST STUDY

## J.1 INTRODUCTION

Previous studies of joint Service acquisition management by both the Defense Science Board (DSB) and the Government Accounting Office (GAO) did not consider test and evaluation (T&E) in the acquisition process in any detail. The DSB study did ask the participating program managers whether they had any problems with the test plan due to jointness. Seventy-five percent of these managers responded that they did not have problems in this area (65 percent Navy, 87 percent Air Force, 75 percent Army). Although this might indicate that T&E is not a serious problem in joint programs, there is considerable room for improvement. Further, the DSB study did not ask questions concerning the amount of joint testing used, if any, or whether there were problems in the execution of the plan due to jointness. The Joint Program Study used these above questions to develop a detailed questionnaire to gather data on testing in the joint program arena.

## J.2 APPROACH AND OBJECTIVE

The main study assumed that the success or failure of certain acquisition functions, including test and evaluation, related directly to the success or failure of the overall acquisition effort. The T&E sub-panel, consisting of test and evaluation experts from each of the Services, questioned this premise because no hard evidence exists in the T&E arena to

support such a claim. Rather than pursue solely an investigation of the relationship between T&E and program success or failure, the test panel suggested that the study examine joint program test activities and approved test planning and management practices as a basis to evaluate the relative merits of each test program. This approach was used because it ensured a basis for identifying areas for improvement in testing in joint acquisition programs even if there was no direct relationship between T&E and overall program success.

It was not possible at the outset to identify those T&E elements that might be affected by jointness. The T&E group, therefore, developed a questionnaire that concentrated on the basic soundness of a test program regardless of the jointness factor. The questionnaire was divided into two major categories, test planning and test execution. Each of these categories was further divided into T&E sub-factors for the purpose of conducting a more in-depth analysis. For example, the sub-factors of test planning included identification of program requirements, use of approved test policy and direction, development of test plans (mainly the Test and Evaluation Master Plan, or TEMP), management of program test activities, and identification and use of appropriate test resources. The test execution category concentrated on the effectiveness of test performance, the efficiency of data analysis, and the dissemination and use of test results. The data collected from this questionnaire was used to analyze those factors unique to T&E in joint acquisition programs and to determine whether correlations did exist between certain T&E factors and program success.

The T&E questionnaire was administered during the program office visits in a face-to-face interview with the program test director and a member of the T&E study team. The

team later assigned numerical values to each answer based on the relative importance of each question. This quantitative assessment of the responses facilitated both the entering of the data into computer files and the computation of a Joint Test Index (JTI) which provided a measure of the relative thoroughness of each program's test activity.

A total of 80 programs were identified for review by the JLC Study Group. Twenty of these programs were not sufficiently mature for the T&E questionnaire to be administered. Of the 60 programs for which questionnaires were completed, only 23 programs actually planned and conducted a joint T&E program. As a result, the sample size for the following discussion is limited to those 23 programs.

## J.3 DISCUSSION

After reviewing the questionnaire results for all 60 programs, the test study group determined that the following nine elements of T&E were most likely to affect the outcome of a joint program:

1. Joint Test Program Existence
2. Joint Test Program Appropriateness
3. Joint Test Commonality of Requirements
4. Joint Test and Evaluation Master Plan (JTEMP)
5. Joint TEMP adequacy
6. Joint TEMP Timeliness
7. Planned Tests Completed

8. OT&E Requirements

9. Adequate Test Articles Provided

Data for each of these nine elements was available for 23 programs and served as the basis for computing the Joint Test Index (JTI) and the correlations with the factors of Success described in the main body of the report. Table J.3-1 shows the 23 programs broken out by acquisition phase

TABLE J.3-1

JOINT TEST INDEX VALUES

| PROGRAM | ACQUISITION PHASE | JOINT TEST INDEX |
|---|---|---|
| AIM 7 | DEPLOYED | .76 |
| SLCM | DEPLOYED | .70 |
| AIM 9 | DEPLOYED | .58 |
| FIOOCIP | DEPLOYED | .55 |
| ALCM | DEPLOYED | .51 |
| GLCM | DEPLOYED | .42 |
| HUMMWV | PRODUCTION | .87 |
| SAW | PRODUCTION | .73 |
| TRI-TAC | PRODUCTION | .72 |
| GATOR | PRODUCTION | .70 |
| HARM | PRODUCTION | .69 |
| PLRS | PRODUCTION | .69 |
| LAV | PRODUCTION | .61 |
| MSCS | PRODUCTION | .58 |
| AMRAAM | FULL SCALE DEVELOPMENT | .72 |
| 9MM PISTOL | FULL SCALE DEVELOPMENT | .70 |
| MSER | FULL SCALE DEVELOPMENT | .67 |
| JTIDS | FULL SCALE DEVELOPMENT | .65 |
| BIG EYE | FULL SCALE DEVELOPMENT | .56 |
| ASPJ | FULL SCALE DEVELOPMENT | .53 |
| COMBAT ID | DEMONSTRATION & VALIDATION | .65 |
| JVX | DEMONSTRATION & VALIDATION | .58 |
| JTACMS | DEMONSTRATION & VALIDATION | .49 |

and by Joint Test Index. Although the correlation analysis did not show any firm relationship between a program's JTI and factors of success, some interesting observations can be drawn from the data. Table J.3-2 shows a breakout of how the programs planned and executed their testing.

TABLE J.3-2

JOINT PROGRAM TESTING METHODS

| TESTING METHOD | NUMBER OF PROGRAMS | PERCENT OF PROGRAMS |
|---|---|---|
| Joint Testing by a Joint Team | 10 | 43.5 |
| Joint Test Team prepared TEMP, but contained Joint testing and single Service testing | 5 | 21.7 |
| TEMP prepared by program manager, but contained Joint Testing and single Service testing | 4 | 17.4 |
| Single Service Testing | 4 | 17.4 |

Twenty-two of the programs had prepared a formal Test and Evaluation Master Plan (TEMP) or a Test Planning Document (TPD). Generally these documents were prepared after Milestone I. Operational Test requirements were considered by all 23 programs, seven prior to Milestone I and the other sixteen prior to Milestone II. Since a primary rationale for joint testing is the savings in time and money that result from common testing, the study group also reviewed each program to assess the degree of common testing performed. Table J.3-3 shows the results of this review.

TABLE J.3-3

COMMONALITY OF JOINT SERVICE TEST REQUIREMENTS

| PERCENT COMMONALITY | 0-25% | 26-50% | 51-75% | 76-100% |
|---|---|---|---|---|
| PERCENT OF PROGRAMS | 17.4% | 4.3% | 34.8% | 43.5% |
| NUMBER OF PROGRAMS | (4) | (4) | (8) | (10) |

## J.4 FINDINGS AND CONCLUSIONS

Although there were no strong correlations between the elements of test and evaluation and the factors of success, there were significant findings. These findings are listed below:

- Of the 60 programs far enough along in the acquisition cycle to answer the T&E questionnaire, only 23 had any joint test planning or execution at all.
- Fewer than half (10 programs) of the 23 actually planned and used joint testing exclusively.
- Many program offices did not have a full time test director. This is particularly troublesome in joint programs due to the amount of coordination required.

Much can be done to achieve economies of scale and save program dollars in the joint T&E area. Program offices can increase joint Service participation in test planning and consequently increase the incidence of joint or concurrent testing, facilitate the sharing of test results, and even encourage the use of another Service's test results to satisfy their own requirements.

The following recommendation is suggested by the T&E study group. <u>A Joint Test Working Group (JTWG) should be established for, and should take an active role in, all joint programs</u>. This group will ensure that the test requirements of all involved Services are met and with the least amount of schedule delay and the least cost to the program.

# APPENDIX K
# LITERATURE ABSTRACTS

The following abstracts summarize the reports, briefings, articles, and studies collected as background material for the Joint Program Management Study. They are presented by Joint Program document number and correspond to the way they are catalogued in the TASC library.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-001 |
| Title: | The Joint Logistics Commanders' Guide for the Management of Joint Service Programs |
| Author: | JLC AD HOC Committee |
| Date: | June 1982 |
| Organization: | Defense Systems Management College |
| Type of Document: | Manual |

This is the first update of this guidebook and is based on comments and input from Joint Program Offices, Service Logistics Commands, and Systems Commands. It provides lessons learned to newly assigned joint program managers, based on the experiences of previous joint program managers. The guidebook is limited to U.S. multi-service programs. It describes the nature of joint programs and how they differ from single-service programs. It includes those aspects of program management that demand greater emphasis, as well as the pitfalls of joint program management.

## DOCUMENT ABSTRACT

Document #: JP-002

Title: "Managing Less-than-Major Joint Programs"

Author: P.E. Oppedahl and H. R. Possie

Date: Spring 1979

Organization: Defense Systems Management College

Type of Document: Article

This article discusses the management of non-major, joint projects, with emphasis on five Navy/Air Force munitions development programs: FAE II, GATOR, BIGEYE, AIR, and MSER. It addresses 4 major areas of concern: the Joint Development Plan, a communications network, teamwork among joint program personnel, and service testing requirements.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-003 |
| Title: | "Review of Management Approaches of Selected Joint Service Acquisition Programs" |
| Author: | A. G. Smith |
| Date: | February 1976 |
| Organization: | Defense Systems Management College |
| Type of Document: | Report |

The author conducted interviews backed up by questionnaires to collect data on ten major joint programs: AIM-7, AIM-9, SHRIKE, STANDARD ARM, HARM, GATOR Mine, FAE II, XM-714 Fuze Family, and AIR. Findings indicate that the services' program personnel determine the success or failure of joint service efforts, the service's peculiar requirements compromise program objectives, the personnel from the executive and participating services should be located in the same program office, the services need a more active DDR&E, and experienced personnel significantly contribute to the success of the joint programs.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-004 |
| Title: | "Problems in the Multi-Service Acquisition of Less-than-Major Ground Communications Electronics Systems" |
| Author: | Leland D. Cox and David B. Wile |
| Date: | June 1981 |
| Organization: | Air Force Institute of Technology |
| Type of Document: | Report |

Problems encountered in the Army/Air Force AN/FTC-41 secure data transmission system could also develop in other multi-service acquisition programs. Problems include coordination, information management, funding, training, and provisioning. Findings were based on the results of a telephone survey that focused on the AN/FTC-41, and six other less-than-major systems, including the AN/FSC-78, AN/TTC-39, AN/TSC-100, AN/MSC-40, and AN/MSC-64. Recommendations include lengthened tours for program managers, education to familiarize personnel with multi-service procedures, early coordination, better Joint Operating Agreements (JOA), computer interface, and implementation of effective provisioning.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-005 |
| Title: | "Joint Service Acquisition" |
| Author: | Defense Science Board |
| Date: | July 1983 |
| Organization: | Defense Science Board |
| Type of Document: | Report |

This report is a detailed study of 24 joint programs and an extensive review of 150 programs. It addresses critical issues, such as: success/jointness criteria; a high-level advocate for oversight and direction; congressional involvement to resolve funding stability and long-term planning; and policy guidance and implementation direction. Also included are program descriptions of AIM-7, AMRAAM, BISS, Milstar, and NAVSTAR.

DOCUMENT ABSTRACT

Document #: JP-006

Title: "Joint Service Weapon Acquisition Program Environment"

Author: M. Wittman

Date: May 1977

Organization: Defense Systems Management College

Type of Document: Report

This study addresses management approaches to and trends in joint service programs for major and non-major programs. Problem areas encountered and methods used to resolve these problem areas are also discussed. The report concludes that joint programs will substantially lessen the impact of shrinking budgets. Recommendations are made for the Navy to establish an independent user's command to express user needs during the requirements generation process. It is also recommended that the Army be included in the Joint Requirements and Development Committee.

## DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-007 |
| Title: | "Joint Major System Acquisition: An Elusive Strategy" |
| Author: | General Accounting Office |
| Date: | May 1983 |
| Organization: | General Accounting Office |
| Type of Document: | Report |

The GAO defines joint progams as major systems (military aircraft, ships, missiles, electronic gear, and other high-cost equipment) that were jointly developed, procured, deployed, and supported. This report concludes that there have been no successful joint programs based on analysis of 15 programs. Programs included in the study were: SEEK TALK, AFSATCOM/FLTSATCOM, AMRAAM, GPS, ALR-67, JTIDS, F-100/F-401 Engine, F-111, MEP, ASPJ, LAV, ALR-69, and MAVERICK. The GAO concludes that the most significant problem in joint programs is resolution of requirements differences. Others are service rivalry, unwillingness to compromise service practices, and delayed merger efforts in the development phase. Recommendations include greater Congressional oversight of joint programs, more JCS involvement in coordinating requirements, and earlier merging of single-service programs to joint efforts by SECDEF.

DOCUMENT ABSTRACT

Document #: JP-008

Title: "Joint Test and Evaluation Procedures Manual"

Author: The BDM Corporation

Date: September 1980

Organization: The BDM Corporation

Type of Document: Manual

This Joint Test and Evaluation (JT&E) manual explains how the Director of Defense for Test and Evaluation administers the JT&E programs, and describes the roles and responsibilities of OSD, the Services, and other Defense agencies. It includes an outline of the mission, organization, and functions of the JT&E Director and the Joint Test Force. The methodologies for planning, budgeting, executing, and controlling the total JT&E program are also described.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-009 |
| Title: | "ECP Processing Delays in a Joint Service Project" |
| Author: | R. W. Platt |
| Date: | May 1976 |
| Organization: | Defense Systems Management College |
| Type of Document: | Report |

This report investigates the Engineering Change Proposal (ECP) process in the Mobile Electric Power project. Delays in implementing engineering changes are explained by the lack of realistic time targets, the lack of tight control over processing status, the size of the Configuration Control Boards, and restrictive processing procedures. Recommended actions to prevent delays include realistic target times for the overall evaluation function, a Configuration Status Accounting System for tighter control, reduction of the Configuration Control Board size, and modification procedures for more direct evaluation inputs.

## DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-010 |
| Title: | "A Study and Evaluation of Selected Joint Service Program-Managed Materiel Acquisition" |
| Author: | J. D. Haney |
| Date: | May 1976 |
| Organization: | Defense Systems Management College |
| Type of Document: | Report |

The case histories of the Mobile Electric Power Generator, the Aircraft Ground-Fire Suppression and Rescue System, and the Surface Container Support Distribution System provide the background for discussion of the achievements and problems associated with three small joint programs initiated during the Vietnam era. The problems were related to service specific requirements, program office control of funding, and lack of coordination among relevant agencies. Achievements were related to the lower procurement costs that resulted from quantity buys and simplified logistics support.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-011 |
| Title: | "Centralized Control, The Missing Ingredient in Multi-Service Programs" |
| Author: | J. C. Clark |
| Date: | May 1979 |
| Organization: | Air Command and Staff College, Maxwell AFB |
| Type of Document: | Report |

This study summarizes directives and policies for managing joint programs, focusing on the tri-service Laser Seeker. This program experienced problems because of the joint nature of the program, including funding instability, requirements creep, requirements change, and inter-service disagreements. The study concludes that joint service successes have been limited due to inadequate management direction and discipline in executing management directives. It recommends that OSD apply greater management control to joint programs.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-012 |
| Title: | "Joint Service Test and Evaluation" |
| Author: | J. M. Bunyard |
| Date: | Summer 1980 |
| Organization: | None |
| Type of Document: | Article |

This article presents an overview of the DoD Joint Test and Evaluation (JT&E) program. It explains the developmental process, current JT&E procedures, and the results of JT&Es conducted to date on the Maverick, including aircraft survivability, air-to-air weapons effectiveness, radar bombing accuracy, electronic warfare, and close air support. A clear distinction is made between joint Service test and evaluation, which means simultaneous testing of complementary weapon systems, and joint testing of a single weapon system for several Services.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-013 |
| Title: | "Eliminating Marine Corps Logistics Overlap Saves Millions" |
| Author: | General Accounting Office |
| Date: | June 1980 |
| Organization: | General Accounting Office |
| Type of Document: | Report |

This GAO review is a follow-up of a 1975 study on Marine Corps logistics activities. Duplication of maintenance operations and facilities management still exists, and there is still too little reliance on the Defense Logistics Agency. For greater cost savings and better logistics efficiency, the GAO recommends the management of supply support service by both DLA and DoD integrated managers. Overhaul work should be performed by the most cost-effective service depots. Integrated managers' depots and DLA warehouses should be used for storage facilities, and purchasing and provisioning functions should be shared with other Services and the DLA.

DOCUMENT ABSTRACT

Document #: JP-014

Title: "Establshing the FAE II"

Author: J. A. Bowen and R. S. Fry

Date: Autumn 1977

Organization: Defense Systems Management College

Type of Document: Article

This article summarizes the development and execution of the FAE II program based on fuel-air explosion technology. The difficulties stated in the article, both technical and procedural, are thought to be typical of those encountered in the initial phases of any joint service development program. The resolutions agreed upon by the Air Force/Navy team to facilitate a working relationship are presented. Insights into joint program management are also presented to assist personnel who will be involved in future joint Service development programs.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-015 (M) |
| Title: | "Summary Report of DoD Logistics Symposium" |
| Author: | |
| Date: | January 1975 |
| Organization: | Office of the Assistant Secretary of Defense |
| Type of Document: | Report |

This summary report presents several key issues germane to the logistics community, including life-cycle cost estimation, single-item management, and design-to-life-cycle cost. Although this document contains no specific references to joint programs, it does present a good summary of logistics considerations.

DOCUMENT ABSTRACT

Document #: JP-016

Title: "Planning Alternatives for Naval Aircraft Gun System Acquisition"

Author: L. E. Young

Date: May 1976

Organization: Defense Systems Management College

Type of Document: Report

Young cites inter-service rivalry as the explanation for the small number of joint gun developments. The article presents brief histories of the 20mm M-61, the 20mm M-50, 25mm configurations, and the 30mm GAU-8 gun. It also outlines OSD's increasing interest in the direction of gun developments. The author argues that the Navy could reduce costs by purchasing already existing ammunition rounds and gun systems, and urges the Navy to reassess its requirements and consider procuring already existing options.

DOCUMENT ABSTRACT

Document #: JP-017

Title: "A Review of the Management of Air Force Air-to-Air Missiles"

Author: F. D. Moruzzi

Date: May 1976

Organization: Defense Systems Management College

Type of Document: Report

This report traces the development of the Air Force air-to-air missile CLAW and its relationship to the Navy version AGILE. The author suggests that the future focus in the U.S. defense system will be on more multi-component arrangements and, therefore, more joint Service programs. The Air Force AAM program is considered an example of how joint program problems can be overcome. According to the author, sufficient development of a technical data base, active participation of key personnel in all aspects of joint program management, and reorganization of the RDT&E production process will eliminate most joint program difficulties.

DOCUMENT ABSTRACT

Document #: JP-018

Title: "An Analysis of Joint Service Acquisition Programs"

Author: J. S. Fargher

Date: June 1982

Organization: Defense Systems Management College

Type of Document: Report

This paper summarizes the Joint Logistics Commanders' "Guide for the Management of Joint Programs." It identifies several benefits of joint programs, such as avoidance of duplication, standardization and interoperability of equipment, reduced development costs, and savings of scarce resources. Highlighted areas of concern include requirements' definition, funding processes, test and evaluation, program office organization and staffing, joint program charter, and software maintenance. Joint program managers from 67 programs were interviewed for this study.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-019 |
| Title: | "Acquisition Policy Effectiveness" |
| Author: | E. Dews and G. Smith |
| Date: | October 1979 |
| Organization: | The Rand Corporation |
| Type of Document: | Report |

This report provides cost, schedule, and performance comparison methodologies based on 32 major weapon systems initiated in the 1970s. Acquisition practices and program outcomes were affected by policy initiatives then in force, including DSARC milestones, program manager authority, and program cost growth. Included are ways to strengthen the acquisition process and ways to improve the quality of information available for tracking and controlling on-going programs.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-020 |
| Title: | "An Analysis of Success on Systems Program Management" |
| Author: | F. Wynn |
| Date: | February 1981 |
| Organization: | Advanced Technology, Inc. |
| Type of Document: | Report |

Success criteria in Air Force weapon system program management were analyzed by means of a questionnaire and a literature review. Respondents defined program success in terms of the realization of cost, schedule, and performance objectives, program stability, timeliness of the deployment, and military impact. Forty major programs were ranked on a scale of 0 to 10. The most successful programs were the C-141, the Maverick, the F-5E/F, the F-16, and the E-3A.

DOCUMENT ABSTRACT

Document #: JP-021

Title: "A Review of the Department of Defense December 31, 1982 Selected Acquisition Reports"

Author: Congressional Budget Office

Date: August 1983

Organization:

Type of Document: Report

This review by the Congressional Budget Office (CBO) of the DoD's Selected Acquisition Reports (SARs) is a condensed version of 900 pages of SAR information. This analysis of the SARs is primarily for use by Congressional staff members working on defense weapon systems acquisition. It is a critical assessment of SAR programs for the years between 1977 and 1983. A discussion of continued cost growth in individual systems and an evaluation of the completeness and accuracy of the SARs are also included.

# DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-022 |
| Title: | "Issues Identified in 21 Recently Published Major Weapon System Reports" |
| Author: | U.S. Comptroller General |
| Date: | June 1980 |
| Organization: | General Acounting Office |
| Type of Document: | Report |

This review of 21 selected major weapon systems highlights the primary issues in weapon system management. These include operational limitations, survivability, availability, requirements, and reliability. Of 17 categories used, 59 percent are reflective of mission effectiveness, while 41 percent center on program acquisition management. Each issue becomes more or less serious depending on DoD action. Five joint programs were reviewed: Cruise Missiles, JTIDS, MAVERICK, HARM, and NAVSTAR.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-023 |
| Title: | "A User's Introduction to the Joint Tactical Information Distribution System (JTIDS)" Vol. 1 |
| Author: | B. J. Workman |
| Date: | October 1975 |
| Organization: | The Mitre Corporation |
| Type of Document: | Report |

This is an older report on the Joint Tactical Information Distribution System (JTIDS) which was used as a guidebook at the Joint Air Force Users' Conference in October 1975. It contains a list of JTIDS characteristics and an explanation of system architecture and organization. It also examines JTIDS' potential for enhancing mission execution and command, and control functions. Also included is a "straw man" proposal for the establishment of user working groups.

DOCUMENT ABSTRACT

Document #: JP-024

Title: "Progress of the Light Armored Vehicle Program Should be Closely Monitored"

Author: Government Accounting Office

Date: August 1982

Organization:

Type of Document: Report

The Light Armored Vehicle's (LAV) potential to be a $1 billion program triggered this review by the General Accounting Office (GAO). Uncertainties such as fluctuating requirements, testing, and helicopter availability for air-lifting vehicles were highlighted. The GAO recommends that the LAV program be placed under the Selected Acquisition Reporting system to ensure close oversight by OSD and Congress.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-025 |
| Title: | "An Analysis of Joint Service Acquisition Programs" |
| Author: | Norman A. McDaniel and Dino A. Lorenzini |
| Date: | June 1979 |
| Organization: | |
| Type of Document: | Report |

A literature survey and interviews of program managers from 25 joint service programs were used to highlight the problems of joint programs. Their most common problems were organizational structure, operating procedures, and personnel. The two cases presented are the Air Force cruise missile program and the selection of a single technical approach to a major Joint Service Acquisition (JSA) program. The authors concluded that organizational interests and bureaucratic politics play a major role in the management of joint programs and that joint program problems are more difficult to resolve because they tend to be addressed at higher management levels.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-026 |
| Title: | "President's Private Sector Survey on Cost Control" (Part II - Issue and Recommendation Summaries, Section B - Weapons) |
| Author: | Grace Commission |
| Date: | July 1983 |
| Organization: | Grace Commission |
| Type of Document: | Report |

This report proposed initiatives for the weapons acquisition process to support recommendations of the Acquisition Improvement Program of 1981. In developing this study, interviews were conducted with former as well as incumbent high-level, DoD officials and private sector individuals in the DoD procurement arena. The Commission recommends that the acquisition function be separated from research and engineering activities and be consolidated under a newly created Under Secretary of Defense for Acquisition. According to the Task Force, consolidated management of acquisition would save billions of dollars annually because of an improved decision-making process.

DOCUMENT ABSTRACT

| | |
|---|---|
| Document #: | JP-027 |
| Title: | "An Approach to Interface Management" |
| Author: | Robert Henry Lison |
| Date: | May 1977 |
| Organization: | Defense Systems Management College |
| Type of Document: | Report |

Using relevant literature, personal interviews, and his experience as the F-15 Armament Project Manager, the author points out that direct control of a program by the program manager is the critical factor in the success of a program. He concludes that interface management has taken on most of the characteristics of basic program management because of joint or complementing program direction, mutual funding agreements, and joint testing. A conceptual model of an interface program with 3 distinct levels of interface control is included.

DOCUMENT ABSTRACT

Document #: JP-028

Title: "Improving the Effectiveness and Acquisition Management of Selected Weapon Systems: A Summary of Major Issues and Recommended Actions"

Author: U.S. Comptroller General

Date: May 1982

Organization: General Accounting Office

Type of Document: Report

This report highlights principal issues of 24 selected weapon system programs including four joint programs: AMRAAM, Aircraft Identification Friend or Foe System, Flight Life-support Equipment, and Space-based Laser. Sixty-one issues were grouped according to system effectiveness and program acquisition. System effectiveness included operational requirements, logistics support, vulnerability, availability, and force level requirements. Program acquisition included affordability, technical risk, cost effectiveness, concurrency, and readiness. The GAO observed that DoD action would minimize risk and ensure effectiveness, improve disclosure to the Congress, and enhance overall program acquisition management.

DOCUMENT ABSTRACT

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| Document #: | JP-029 |
| Title: | "Report of the Analysis of the Joint Medium-Range Air-to-Surface Missile Program" |
| Author: | Maxfield Associates, Inc. |
| Date: | January 1980 |
| Organization: | None |
| Type of Document: | Report |

This analysis of the JMRASM program focuses on the technical alternatives and feasibility of developing a viable weapon system offering increased performance and survivability in future hostile environments. In addition to background on the development of the air-to-surface missile program, the report outlines topics that reflect the recommended inputs and models for the acquisition planning of the JMRASM project.

DOCUMENT ABSTRACT

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|---|---|
| Document #: | JP-030 |
| Title: | "Army/Navy-Guided Projectiles: A Joint Program that Works" |
| Author: | J. D. Miceli |
| Date: | Summer 1979 |
| Organization: | Defense Systems Management Review |
| Type of Document: | Article |

This article depicts the successful joint efforts of the Army and Navy in the development of semi-active, laser-guided projectiles. Besides strong leadership, the author advocates early formulation of a joint charter for achievement of maximum commonality. He also recommends the use of jointness as an effective motivational force on individual Service staffs to solve problems expeditiously and suggests that multi-faceted backgrounds and different points of view tend to improve overall project management.

DOCUMENT ABSTRACT

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|---|---|
| Document #: | JP-031 |
| Title: | "Representation and Responsibility in a Tri-Service Program" |
| Author: | William C. Wall, Jr. |
| Date: | Spring 1979 |
| Organization: | Defense Systems Management Review |
| Type of Document: | Article |

In this article, the author considers teamwork as the key to the success of any program. He examines the significance of interface management in the Ground Laser Designators (GLD) project by describing the roles and responsibilities of the Air Force, Army, and Marine Corps in this tri-Service program. The program manager is the primary player who must coordinate the varied activities of the project and represent the needs of all the services involved. His ability to establish a rapport with all the Services is crucial to creating the team environment necessary to carry out the complex tasks of joint program management.

DOCUMENT ABSTRACT

Document #: JP-032

Title: "Joint Programs"

Author: Dr. Richard D. DeLauer

Date: June 1983

Organization: OUSDR&E

Type of Document: Speech

Dr. DeLauer addressed the Senate Subcommittee on Defense Appropriations in this brief speech. His talk focused on the advantages that would accrue if joint acquisition programs were given a chance to develop. Particular attention was given to JSTARS, JTACMS, and JTFP. He believes that the aim of joint programs is to use resources efficiently and wisely. He recommended the establishment of an oversight group composed of senior service and OSD executives and the development of detailed inter-Service agreements on joint requirements for single-hardware development before implementation of a joint program.

DOCUMENT ABSTRACT

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|---|---|
| Document #: | JP-033 |
| Title: | "Inter-Service Weapons Rivalry" |
| Author: | Richard D. Coulam |
| Date: | June 1977 |
| Organization: | Bulletin of the Atomic Scientists |
| Type of Document: | Article |

This article emphasizes the drawbacks of three joint programs, the F-4, F-111, and A-7. The author points out that Service resistance to establishing jointness is deeply ingrained in parochial interests. The Services fear loss of authority on the part of their acquisition personnel and are skeptical about another Service's weapon system capability. He concludes that for a bi-Service program to succeed, there must be minimization of role conflicts among the Services and definitive agreement on cost and performance issues.

## DOCUMENT ABSTRACT

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| Document #: | JP-034 |
| Title: | "The Joint Cruise Missiles Project: An Acquisition History." |
| Author: | E. H. Conrow, G. K. Smith, and A. A. Barbour |
| Date: | August 1982 |
| Organization: | The Rand Corporation |
| Type of Document: | Report |

This report documents the development of the Joint Cruise Missile Project by examining the events that led to the formation of the project office and by reviewing the technical and organizational issues applied in the management of the joint cruise missile program. It includes a summary of the cruise missile programs of the Air Force and the Navy, key issues during the project such as commonality, management, and contracting strategy, and the use of innovative techniques that may be applicable to future projects including concurrency, dual sourcing, and product quality assurance through warranties.

DOCUMENT ABSTRACT

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|---|---|
| Document #: | JP-035 |
| Title: | "Joint Project Management" |
| Author: | R. G. Freeman |
| Date: | July 1983 |
| Organization: | None |
| Type of Document: | Speech |

This brief paper documents the personal experience of retired RADM Freeman III while associated with joint programs. The author discusses the Sparrow, Side-Winder, High-Energy Laser, Harpoon, Heavy-Lift Helicopter, Joint Engine Program, TACAN, V-HUD, and AHF programs. Listed are the critical elements that affect the success or failure of a joint program including the program managers, requirements definition and flexibility, fiscal arrangements, arbitration management at the lowest level, and maximum use of joint programs for system components rather than major systems.

DOCUMENT ABSTRACT

Document #: JP-036

Title: "Joint Service Acquisition Programs: Can They Be More Productive?"

Author: Unknown

Date: Unknown

Organization: Unknown

Type of Document: Report

Factors that lead to the success or failure of joint programs are analyzed in this brief paper. Emphasis is on Navy and Air Force air-launched armaments programs. It discusses some successful joint acquisition programs (Sidewinder, Sparrow, Rockeye, Shrike, and Standard Arm) and some unsuccessful joint programs (Laser Maverick, FAE II, AIR, MSER, and Joint Service Weapons Data Link). Also included is a discussion of some joint programs whose outcome is unclear (MRASM, HARM, BIGEYE, AMRAAM, and GATOR). The factors used for analysis are the selection process, the impact of technical constituencies, funding flexibility, and support.

DOCUMENT ABSTRACT

Document #: JP-037

Title: "Joint Program Management"

Author: Richard D. DeLauer

Date: March 1984

Organization: OUSDR&E

Type of Document: Speech

In this statement before the House Armed Services Committee, Dr. DeLauer discusses the need for joint programs and their impact on today's Service acquisition process. He stresses Service doctrine, awareness of participants' common needs, the need for a broader scope of joint program activities, the JLC oversight role on individual programs, special management and funding procedures for technology-base programs, and the use of advisory groups to coordinate complementary efforts. He suggests the use of the following criteria in establishing joint programs: mission effectiveness, military doctrine application, and joint agreement on mission needs.

DOCUMENT ABSTRACT

Document #: JP-038

Title: "TIPI DC/SR System Description and Interface Capability"

Author: J. H. Keating

Date: April 1979

Organization: None

Type of Document: Report

This volume provides reference material on the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program. While this volume is not devoted to the managerial aspect of the program, it offers useful information on the operational aspects of the TIPI segments, specifically the DC/SR (Display and Control/Storage and Retrieval Segment).

DOCUMENT ABSTRACT

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| Document #: | JP-039 |
| Title: | Differences in Aircraft Acquisition Management Practices between the Air Force and the Navy |
| Author: | Terry Edward Magee |
| Date: | June 1977 |
| Organization: | Navy Post Graduate School |
| Type of Document: | Thesis |

The author examines and compares the management practices and techniques in the procurement of the Navy F-14 and the Air Force F-15. The Navy's strategy is to be flexible and react quickly regardless of the situation. The Air Force prefers to establish extensive standardization and detailed procedures first. The author concludes that the aircraft acquisition management field is short on manpower and lacking in expertise in the business and financial aspects of weapon acquisition. He recommends advanced education, the formation of an Acquisition Corps to provide expertise and continuity, and the development of increased inter-Service cooperation and information flows through an established co-procurement policy.

DOCUMENT ABSTRACT

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|---|---|
| Document #: | JP-040 |
| Title: | "The Integration of Fragmented Non-Major Systems: A Management Problem" |
| Author: | Kenneth Allen Gale |
| Date: | November 1975 |
| Organization: | Defense Systems Management College |
| Type of Document: | Report |

The modular weapon program (MWP), according to the author, is an innovative acquisition management concept that was proposed by the Air Force to provide technically efficient weapons while avoiding the proliferation of individual weapon systems. This report traces briefly the evolution of the MWP from the Air Force involvement in the development and production of air-to-surface guided weapons to the management problems associated with the process of integrating fragmented programs like the GBU-15. The author concludes that the concept also has practical application to other types of systems such as remotely piloted vehicles (RPVs).